

## 2006 Buick Lucerne CXS

2006 SUSPENSION Automatic Level Control - Lucerne

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#### Automatic Level Control - Lucerne

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

#### Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Compressor Bracket to Vehicle Bolt	9 N.m	80 lb in
Air Compressor Bracket to Vehicle Nuts	9 N.m	80 lb in
Air Compressor Head to Air Compressor Bolts	6 N.m	53 lb in
Air Compressor to Bracket Bolts	3 N.m	26 lb in
Brackets to Air Compressor Screws	7 N.m	62 lb in
Harness Tie to Air Compressor Head Bolt	3 N.m	26 lb in
Heat Shield to Air Compressor Bracket Bolts	4 N.m	35 lb in
Height Sensor to Vehicle Nut	9 N.m	80 lb in

## SCHEMATIC AND ROUTING DIAGRAMS

### AUTOMATIC LEVEL CONTROL SCHEMATICS

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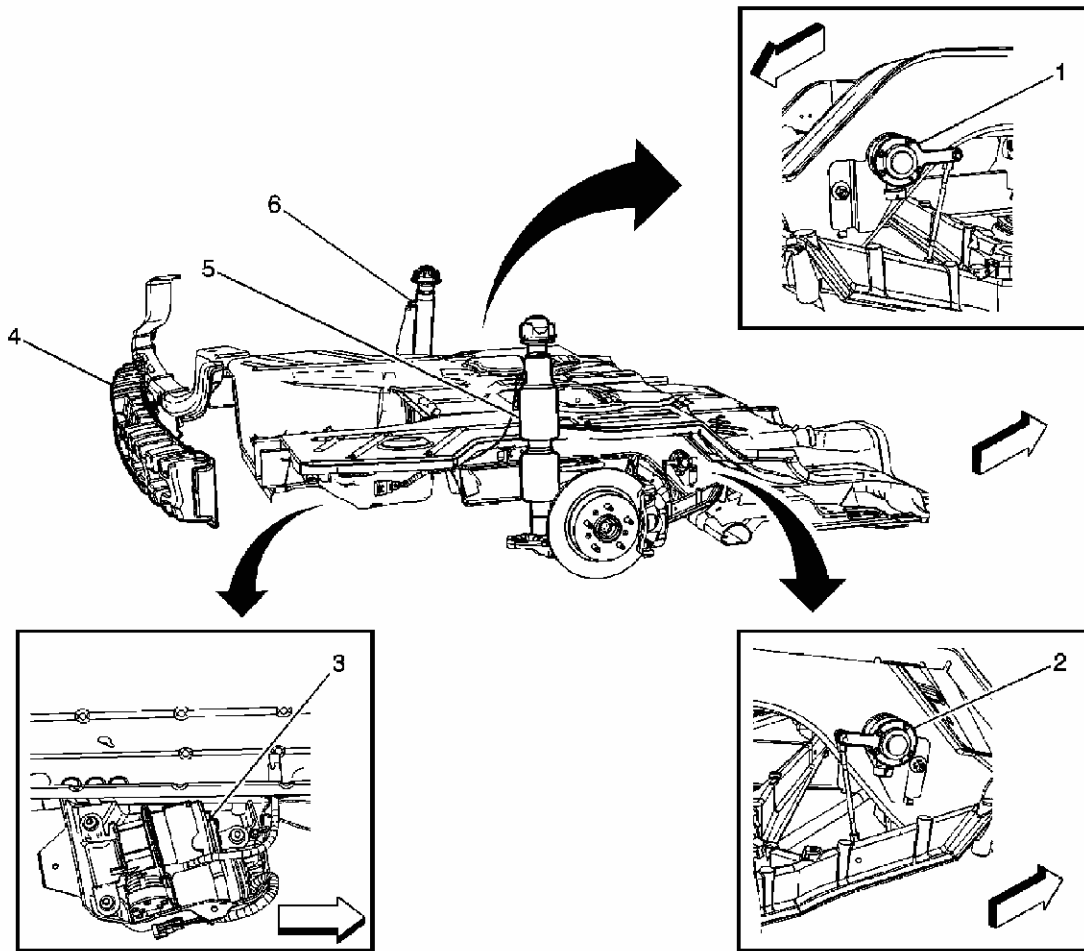
**Fig. 2: Automatic Level Control Schematic - w/F55**  
**Courtesy of GENERAL MOTORS CORP.**

## COMPONENT LOCATOR

## AUTOMATIC LEVEL CONTROL COMPONENT VIEWS

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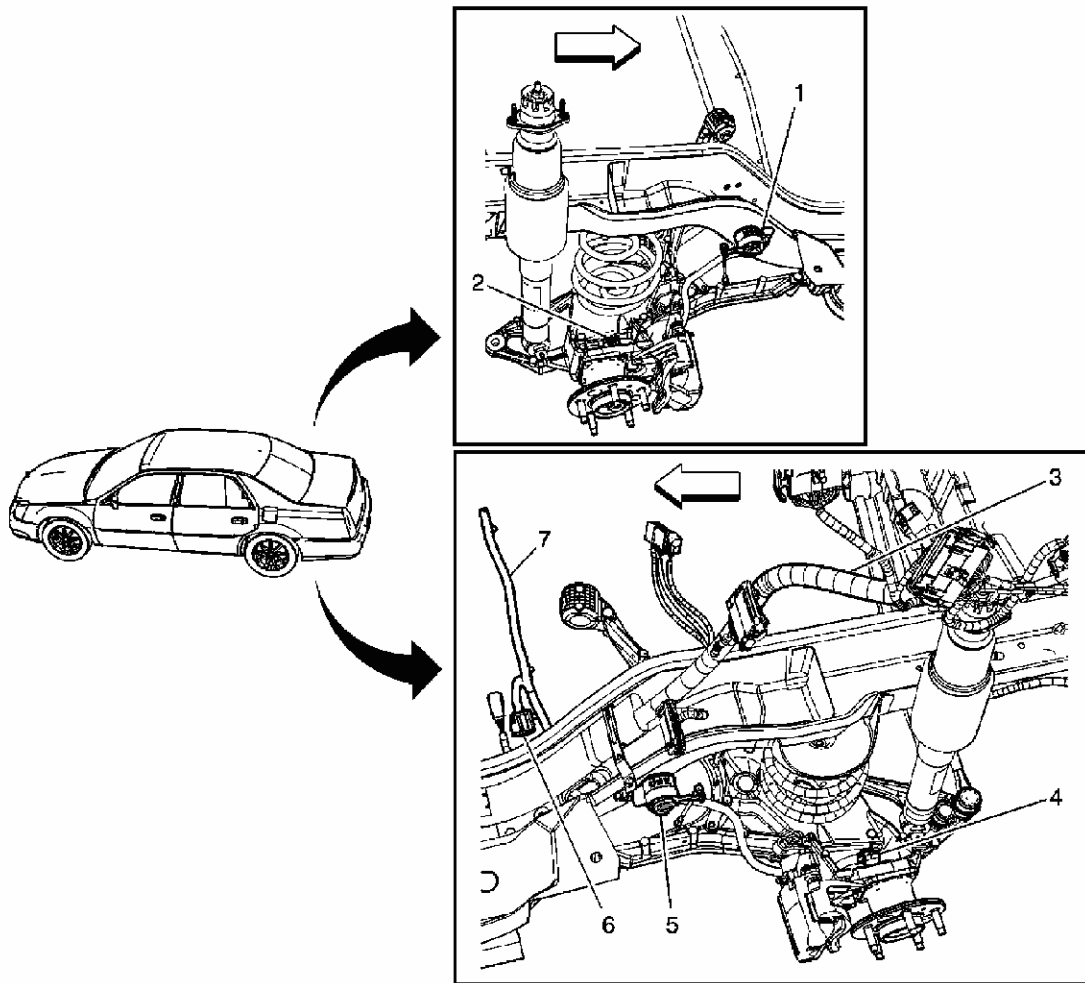
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**Fig. 3: Identifying Rear Suspension Components**  
Courtesy of GENERAL MOTORS CORP.

#### Callouts For Fig. 3

Callout	Component Name
1	Suspension Position Sensor - LR (F55)
2	Suspension Position Sensor - RR (F55)
3	Automatic Level Control (ALC) Compressor
4	Rear Bumper
5	Suspension Damper - RR (F55)
6	Suspension Damper - LR (F55)

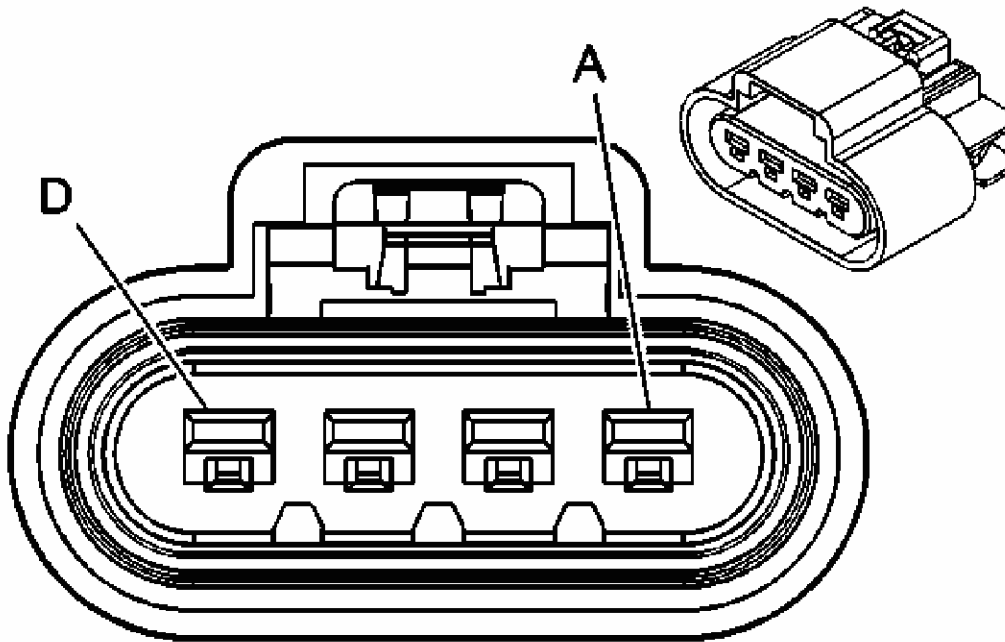


**Fig. 4: View Of Rear Axle Area**  
**Courtesy of GENERAL MOTORS CORP.**

**Callouts For Fig. 4**

Callout	Component Name
1	Suspension Position Sensor - RR (F55)
2	Wheel Speed Sensor - RR
3	Body Harness
4	Wheel Speed Sensor - LR
5	Suspension Position Sensor - LR (F55), Automatic Level Control Module (FE1, FE3, F41)
6	C308 Rear Wheel Speed Harness to Chassis Harness
7	Rear Wheel Speed Harness

**AUTOMATIC LEVEL CONTROL CONNECTOR END VIEWS**



**Fig. 5: Automatic Level Control (ALC) Compressor Connector End View**  
Courtesy of GENERAL MOTORS CORP.

#### Automatic Level Control Connector End Views

##### Connector Part Information

- OEM: 15326631
- Service: 15306360
- Description: 4-Way F GT 280 Series Sealed 5.8 (BK)

##### Terminal Part Information

- Pins: A, B, C, D
- Terminal/Tray: 15304719/19
- Core/Insulation Crimp: E/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

#### Automatic Level Control (ALC) Compressor

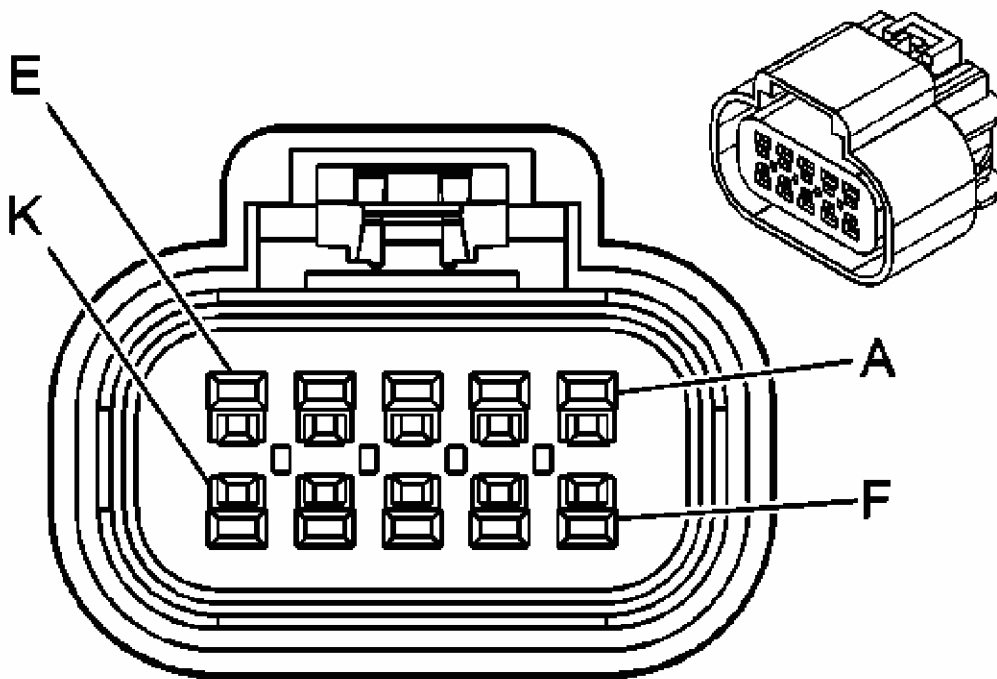
Pin	Wire Color	Circuit No.	Function
A	WH	320	Automatic Level Control Exhaust Solenoid Control

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Pin	Wire Color	Circuit No.	Automatic Level Control Function
B	D-GN	322	Automatic Level Control Compressor
A	WH	320	Motor Supply Voltage
C	RD/WH	3340	Automatic Level Control Exhaust
			Body Position Voltage
D	BK	1050	Ground

### Automatic Level Control Module (FE1, FE3, F41)



**Fig. 6: Automatic Level Control Module (FE1, FE3, F41) Connector End View**  
 Courtesy of GENERAL MOTORS CORP.

### Automatic Level Control Connector End Views

#### Connector Part Information

- OEM: 15326842
- Service: 15326842
- Description: 10-Way F 150 Series Sealed (BK)

#### Terminal Part Information

- Pins: A, C, D, E, F, G, H, J, K
- Terminal/Tray: 12191819/8

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**Connector Part Information**

- Release Tool/Test Probe: 15315247/J-35616-2A (GY)

**Automatic Level Control Module (FE1, FE3, F41)**

Pin	Wire Color	Circuit No.	Function
A	WH	320	Automatic Level Control Exhaust Solenoid Control
B	-	-	Not Used
C	BK	850	Ground
D	TN/BK	2500	High Speed GMLAN Serial Data Bus +
E	RD/WH	3340	Battery Positive Voltage
F	YE	321	Automatic Level Control Relay Control
G	TN	2501	High Speed GMLAN Serial Data Bus-
H	TN	2501	High Speed GMLAN Serial Data Bus-
J	TN/BK	2500	High Speed GMLAN Serial Data Bus +
K	OG/YE	5727	High Speed GMLAN Serial Data Wake Up

**DIAGNOSTIC INFORMATION AND PROCEDURES****DIAGNOSTIC CODE INDEX****DIAGNOSTIC CODE INDEX**

DTC	Description
<b><u>DTC C0550</u></b>	Electronic Control Unit (ECU) Performance
<b><u>DTC C0558</u></b>	Calibration Data Not Programmed
<b><u>DTC C0625</u></b>	Left Rear Position Sensor Circuit
<b><u>DTC C0660</u></b>	Level Control Exhaust Circuit shorted to voltage/Ground
<b><u>DTC C0696</u></b>	Position Sensor Overcurrent (5 volt supply)
<b><u>DTC C0712</u></b>	**DESCRIPTION NOT COLLECTED **
<b><u>DTC C0895</u></b>	Device Voltage

**DIAGNOSTIC STARTING POINT - AUTOMATIC LEVEL CONTROL**

Begin the system diagnosis with **Diagnostic System Check - Vehicle** . The Diagnostic System



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Check will provide the following information:

- The identification of the control module which command the system
- The ability of the control module to communicate through the serial data circuit
- The identification of any stored DTCs and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

### SCAN TOOL OUTPUT CONTROLS

#### Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection	Description
Compressor Relay Command	ESCM	Commands the compressor ON and OFF. The engine must be running in order to use this output control.
Exhaust Valve Command	ESCM	Commands the exhaust valve ON and OFF. The engine must be running in order to use this output control.
ALC Trimset	ESCM	Commands the recalibration of the suspension control module for ride height.

### SCAN TOOL DATA LIST

#### Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
<b>Operating Conditions: Ignition ON/Engine OFF</b>			
Battery Voltage	ESCM	Volts	12.6 Volts
Compressor Relay Command	ESCM	On/Off	Off
Exhaust Valve Command	ESCM	On/Off	Off
Suspension Position Sensor Signal	ESCM	Volts	Varies

### SCAN TOOL DATA DEFINITIONS

#### Automatic Level Control Scan Tool Data Definitions:

The Automatic Level Control (ALC) Scan Tool Data Definitions contains a brief description of all scan tool parameters.

#### Battery Voltage

The scan tool displays 0-26.0 volts. The battery voltage represents the system voltage measured at the controller battery input.

### **Compressor Relay Command**

The scan tool displays On/Off. The scan tool will display On when the vehicle trim height is below a preset value. The ALC compressor inflates the rear airlift shocks until the vehicle reaches the desired trim height. When the vehicle is at the desired trim height, the scan tool will display Off.

### **Exhaust Valve Command**

The scan tool displays On/Off. The scan tool will display On when the vehicle trim height is above a preset value. The ALC exhaust solenoid deflates the rear airlift shocks until the vehicle reaches the desired trim height. When the vehicle is at the desired trim height, the scan tool will display Off.

### **Suspension Position Sensor Signal**

The scan tool displays the voltage signal input from the suspension position sensor.

### **DTC C0550**

#### **Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

#### **DTC Descriptor**

### **DTC C0550**

Electronic Control Unit (ECU) Performance

#### **Circuit/System Description**

The automatic level control (ALC) sensor detects an internal malfunction.

#### **Conditions for Running the DTC**

The ignition switch is in the ON position.

#### **Conditions for Setting the DTC**

An internal ALC sensor malfunction exists.

**Action Taken When the DTC Sets**

One or more of the following actions may occur:

- The ALC system is disabled.
- The SERVICE SUSPENSION SYS message is displayed.

**Conditions for Clearing the MIL/DTC**

- The condition for the DTC is no longer present and the DTC is cleared with a scan tool.
- The electronic brake control module (EBCM) automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

**Circuit/System Verification**

DTC C0550 will set as result of internal ALC sensor circuit failure.

- Replace the ALC sensor.

**Repair Procedures**

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

**Control Module References** - Automatic Level Control Sensor**DTC C0558****Circuit Description**

The automatic level control (ALC) sensor performs checks of internal calibration data. If a fault condition is detected, the ALC sensor will set the fault DTC and may, depending upon the fault type, turn ON the SERVICE SUSPENSION SYSTEM message. Recovery from any controller fault condition is attempted only after the ignition is cycled ON and OFF.

**DTC Descriptor**

This diagnostic procedure supports the following DTC:

DTC C0558 Calibration Data Not Programmed

This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description** .

**DTC C0558**

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DTC Symptom	DTC Symptom Descriptor
00	Calibration Data Not Programmed

#### Conditions for Running the DTC

The ignition is ON.

#### Conditions for Setting the DTC

- The DTC is set when any calibration faults internal to the ALC sensor are detected.
- The fault is detected during 3 consecutive ignition cycles or during the same ignition cycle after clearing the DTC with the scan tool.

#### Action Taken When the DTC Sets

- Disable all functionality.
- Sends a message to the instrument panel cluster (IPC) to display the SERVICE SUSPENSION SYSTEM message.

#### Conditions for Clearing the MIL/DTC

- The scan tool can be used to clear the DTC.
- The DTC is saved as HISTORY when the ALC sensor no longer senses the hardware fault and the ignition is cycled OFF and ON.

#### Test Description

The number below refers to the step number on the diagnostic table.

**2:** This step checks to see if the problem has cleared after the ALC sensor has been calibrated.

#### DTC C0558

Step	Action	Yes	No
1	Did you perform the Diagnostic System Check - Vehicle?  1. Install the scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Calibrate the automatic level control (ALC) module using the	Go to <b>Step 2</b>	Go to <b><u>Diagnostic System Check - Vehicle</u></b>

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Step	scan tool. Action	Yes	No
1	Did you use the scan tool to clear the Diagnostic System Check DTC Vehicle?		Go to <b><u>Diagnostic System Check Vehicle</u></b>
2	5. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.	Go to <b>Step 2</b>	
	Does the DTC reset?	Go to <b>Step 3</b>	System OK
3	Replace the ALC sensor. Refer to <b><u>Control Module References</u></b> for replacement, setup and programming. Did you complete the replacement?	Go to <b>Step 4</b>	-
4	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.		
	Does the DTC reset?	Go to <b>Step 2</b>	System OK

### DTC C0625

#### Circuit Description

The automatic level control (ALC) sensor provides a signal voltage between 0.3-4.7 volts to its internal module. This signal voltage represents the wheel's position relative to the body. The ALC module is internal to the ALC sensor and no external circuits are involved.

#### DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC C0625 Left Rear Position Sensor Circuit

This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description** .

### DTC C0625

DTC Symptom	DTC Symptom Descriptor
08	Signal Invalid

#### Conditions for Running the DTC

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At power-up and continuous when ignition is activated

#### Conditions for Setting the DTC

The ALC control module senses a suspension sensor voltage below 0.3 volt or above 4.7 volts.

#### Action Taken When the DTC Sets

- ALC functionality is suspended.
- SERVICE AIR SUSPENSION message is displayed.

#### Conditions for Clearing the DTC

The DTC will clear when the condition for setting the DTC is removed.

#### Diagnostic Aids

This DTC is set for a high or low signal to the ALC control module from the position sensor. The ALC module is internal to the ALC sensor and no external circuits are involved.

#### DTC C0625

Step	Action	Values	Yes	No
<b>Schematic Reference: <u>Automatic Level Control Schematics</u></b>				
1	Did you perform the Diagnostic System Check - Vehicle?	-	Go to Step 2	Go to <b><u>Diagnostic System Check - Vehicle</u></b>
2	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Suspension Position Sensor Signal parameter in the data list for the ALC control module.	0.3-4.7 V		
3	Is the Suspension Position Sensor Signal parameter within the specified range?	-	Go to Diagnostic Aids	Go to <b>Step 3</b>
	Inspect for poor connections at the harness connector of the automatic level control (ALC) sensor. Refer to <b><u>Testing for Intermittent Conditions and Poor</u></b>			

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Step	Connections and Wiring	Values	Yes	No
<b>Schematic</b>	<b>Reference: Automatic Level Control Schematics</b>			
	Did you find and correct the condition? Did you perform the Diagnostic System Check - Vehicle?		Go to <b>Step 5</b>	Go to <b>Step 4</b>
1	Replace the ALC sensor. Refer to <b>Automatic Level Control Sensor Replacement</b> .	-		<b>System Check - Vehicle</b>
4		-	Go to <b>Step 2</b>	
	Did you complete the replacement? 1. Turn ON the ignition, with the engine OFF. 1. Use the scan tool in order to clear the DTCs. 2. With a scan tool, observe the Suspension Position Sensor signal parameter. Within the Conditions for Running the DTC, a list of the ALC control module.		Go to <b>Step 5</b>	-
5		0.3-4.7 V		
2	Does DTC C0625 persist? Is the Suspension Position Sensor		Go to <b>Step 2</b>	System OK

## DTC C0660

### Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

### DTC Descriptors

## DTC C0660 01

Level Control Exhaust Circuit shorted to voltage

## DTC C0660 06

Level Control Exhaust Circuit shorted to ground or open

### Circuit Description

The automatic level control (ALC) adjusts the vehicle suspension ride height. The electronic suspension control (ESC) module determines the height of the vehicle based on the signal from the rear height sensors. The ESC raises and lowers the vehicle in order to keep the vehicle level.

### Conditions for Running the DTC

- The ESC module is powered up.
- The exhaust valve is commanded ON.

**Conditions for Setting the DTC**

The exhaust valve control circuit is shorted to voltage, ground or open.

**Action Taken When the DTC Sets**

The ALC will be inoperative.

**Conditions for Clearing the MIL/DTC**

- DTC C0660 will change from a current DTC to a history DTC on the next ignition cycle.
- DTC C0660 will be cleared from history after 100 ignition cycles.

**Diagnostic Aids**

- Inspect for the addition of aftermarket components.
- Inspect all wiring harnesses carefully for chaffs and proper routing.
- This circuit is monitored every 3 milliseconds. If the exhaust valve solenoid is found to shorted to battery for 10 milliseconds the code will be stored as current.

**Circuit/System Verification**

Ignition ON, command the Automatic Level Control (ALC) exhaust solenoid valve ON and OFF with a scan tool. The exhaust solenoid valve should turn ON and OFF with each command.

**Circuit/System Testing**

1. Ignition OFF, disconnect the automatic level control (ALC) compressor.
2. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal A and ground.
  - If the test lamp illuminates, test the control circuit for a short to voltage.
3. Verify that a test lamp illuminates between the B+ circuit terminal C and ground.
  - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ELC MDL fuse is open, test the control circuit for a short to ground. If the circuit tests normal, test or replace the automatic level control (ALC) compressor assembly.
4. Connect a test lamp between the B+ circuit terminal C and the control circuit terminal A.
5. Command the exhaust solenoid ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.



- If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, replace the ESC module.
- If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ESC module.

**Repair Procedures**

- **Air Compressor Replacement**
- **Control Module References** for Electronic Suspension Control Module replacement, setup and programming

**Repair Verification**

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming or setup procedures that are required when a component or module is removed or replaced.
3. Clear the DTCs.
4. Use the scan tool Diagnostic Counter Reset output control function to bypass the 3 consecutive ignition cycle requirement for setting a DTC. This will ensure that if a DTC was to be reset during the repair verification process, it will be displayed on the scan tool.
5. Turn OFF the ignition for 60 seconds.
6. Turn ON the ignition.
7. If the repair was related to a DTC, duplicate the Conditions for Running the DTC and use the Freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the **Diagnostic Trouble Code (DTC) List - Vehicle** and perform the appropriate diagnostic procedure.

**DTC C0696****Circuit Description**

The automatic level control (ALC) module provides 5 volts to the position sensor. The ALC sensor also monitors this voltage supply for a fault condition which prevents proper regulation. The control module is internal to the ALC sensor. No external circuits are involved.

**DTC Descriptor**

This diagnostic procedure supports the following DTC:

DTC C0696 Position Sensor Overcurrent (5 volt supply)

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This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description** .

#### DTC C0696

DTC Symptom	DTC Symptom Descriptor
00	No additional information

#### Conditions for Running the DTC

The ignition is ON.

#### Conditions for Setting the DTC

- The position sensor supply voltage is outside the valid range of 4.75-5.25 volts.
- The fault is detected for 1 second or more during ignition cycles or during the same ignition cycle after clearing the DTC with a scan tool.

#### Action Taken When the DTC Sets

- The ALC sensor will set a current DTC
- The SERVICE SUSPENSION SYS messages will be displayed
- The ALC system will not operate

#### Conditions for Clearing the MIL/DTC

- The scan tool can be used to clear the DTC.
- The DTC is saved as history when the ALC sensor no longer sees a position sensor supply voltage outside the valid range of 4.75-5.25 volts. The DTC will clear if the fault does not return after 50 consecutive ignition cycles.

#### Diagnostic Aids

- The control module is internal to the ALC sensor and no external circuits are involved. If DTC C0696 sets and cannot be cleared, replace the ALC sensor. Refer to **Automatic Level Control Sensor Replacement**
- If DTC C0696 is stored in history, refer to **Testing for Intermittent Conditions and Poor Connections** .

#### DTC C0696

Step	Action	Values	Yes	No
<b>Schematic Reference: <u>Automatic Level Control Schematics</u></b>				
	Did you perform the Diagnostic System Check - Vehicle?			Go to <b>Diagnostic</b>

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Step	Action	Values	Yes	SystemNo
<b>Schematic</b>	<b>Reference: <u>Automatic Level Control Schematics</u></b>			<b><u>Check -</u></b>
			Go to <b>Step 2</b>	<b><u>Vehicle</u></b>
2	1. Turn ON the ignition, with the engine OFF. 2. With a scan tool, observe the Suspension Position Sensor Signal parameter in the data list for the ALC control module.	0.3-4.7 V		
	Is the Suspension Position Sensor Signal parameter within the specified range?		Go to Diagnostic Aids	Go to <b>Step 3</b>
3	Inspect for poor connections at the harness connector of the ALC sensor. Refer to <b><u>Testing for Intermittent Conditions and Poor Connections</u></b> and <b><u>Wiring Repairs</u></b> . Did you find and correct the condition?	-		
	Replace the ALC sensor. Refer to <b><u>Automatic Level Control Sensor Replacement</u></b> .		Go to <b>Step 5</b>	Go to <b>Step 4</b>
4	Did you complete the replacement?	-		
	1. Use the scan tool in order to clear the DTCs.		Go to <b>Step 5</b>	-
5	2. Operate the vehicle within the Conditions for Running the DTC.	-		
	Does DTC C0696 reset?		Go to <b>Step 2</b>	System OK

### DTC C0712

#### Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

**DTC Descriptors****DTC C0712 01**

Level Control Compressor Circuit shorted to voltage

**DTC C0712 06**

Level Control Compressor Circuit shorted to ground or open

**Circuit/System Description**

The automatic level control (ALC) adjusts the vehicle suspension ride height. The electronic suspension control (ESC) module determines the height of the vehicle based on the voltage from the ALC sensor. The ESC module grounds the ELC COMP relay and the exhaust control solenoid to raise and lower the vehicle in order to keep the vehicle level.

**Conditions for Running the DTC**

- The ESC module is powered up.
- The ESC module is commanding the compressor ON.

**Conditions for Setting the DTC**

The compressor relay output is shorted to voltage, ground or open for 10 seconds.

**Action Taken When the DTC Sets**

The ALC will be inoperative.

**Conditions for Clearing the DTC**

The ESC module does not detect a failure during the self test.

**Diagnostic Aids**

This circuit is monitored during every functional operation of the compressor relay output and every 3.3 milliseconds when output is active. If a compressor relay fault is detected, the ESC module retries the output every 15 seconds to try to recover from the fault.

**Reference Information****Schematic Reference****Automatic Level Control Schematics****Connector End View Reference**

## **Automatic Level Control Connector End Views**

### **Description and Operation**

### **Automatic Level Control Description and Operation (F55) or Automatic Level Control Description and Operation (w/o F55)**

#### **Electrical Information Reference**

- **Circuit Testing**
- **Wiring Repairs**
- **Underhood Electrical Center or Junction Block Replacement**
- **Repairing Connector Terminals**

#### **Scan Tool Reference**

- **Scan Tool Output Controls**
- **Scan Tool Data List**
- **Scan Tool Data Definitions**

#### **Circuit/System Verification**

Ignition ON, command the compressor relay ON with a scan tool. Listen for the operation of the ELC CMPRSR relay and the ALC compressor.

#### **Circuit/System Testing**

1. Ignition OFF, disconnect the ELC CMPRSR relay.
2. Ignition ON, verify that a test lamp does not illuminate between the control circuit terminal 11 and ground.
  - If the test lamp illuminates, test the control circuit for a short to voltage.
3. Verify that a test lamp illuminates between the B+ circuit terminal 15 and ground.
  - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance. If the circuit tests normal and the ELC CMPRSR fuse is open, test the control circuit terminal 12 for a short to ground. If the circuit tests normal, test or replace the ELC CMPRSR relay.
4. Connect a test lamp between the B+ circuit terminal 15 and the control circuit terminal 11.
5. Command the ELC CMPRSR relay ON and OFF with a scan tool. The test lamp should turn ON and OFF when changing between the commanded states.
  - If the test lamp is always ON, test the control circuit for a short to ground. If the circuit tests normal, replace the ESC module.

- If the test lamp is always OFF, test the control circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ESC module.
- 6. If all circuits test normal, test or replace the ELC CMPRSR relay.

**Component Testing****Relay Test**

1. Ignition OFF, disconnect the ELC CMPRSR relay.
2. Test for 40-200 ohms of resistance between terminals 85 and 86.
  - If the resistance is not within the specified range, replace the relay.
3. Test for infinite resistance between the following terminals:
  - 30 and 86
  - 30 and 87
  - 30 and 85
  - 85 and 87
  - If not the specified value, replace the relay.
4. Test for less than 2 ohms of resistance between terminals 30 and 87A.
  - If greater than the specified range, replace the relay.
5. Install a 3-amp fused jumper wire between relay terminal 85 and 12 volts. Install a jumper wire between relay terminal 86 and ground. Test for less than 2 ohms of resistance between terminals 30 and 87.
  - If greater than the specified range, replace the relay.

**Repair Procedures**

- **Relay Replacement (Within an Electrical Center) or Relay Replacement (Attached to Wire Harness)**
- **Control Module References** for Electronic Suspension Control Module replacement, setup and programming

**Repair Verification**

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming or setup procedures that are required when a component or module is removed or replaced.
3. Clear the DTCs.
4. Use the scan tool Diagnostic Counter Reset output control function to bypass the 3 consecutive ignition cycle requirement for setting a DTC. This will ensure that if a DTC

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was to be reset during the repair verification process, it will be displayed on the scan tool.

5. Turn OFF the ignition for 60 seconds.
6. Turn ON the ignition.
7. If the repair was related to a DTC, duplicate the Conditions for Running the DTC and use the Freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the **Diagnostic Trouble Code (DTC) List - Vehicle** and perform the appropriate diagnostic procedure.

#### DTC C0895

##### Circuit Description

Voltage is supplied to the automatic level control (ALC) sensor in the battery positive voltage circuit and the ignition voltage circuit. The ALC sensor monitors the supplied voltage to determine if it is within a valid operating range.

##### DTC Descriptor

This diagnostic procedure supports the following DTC:

DTC C0895 Device Voltage

This vehicle has DTCs which include DTC Symptoms. For more information on DTC Symptoms, refer to **DTC Symptom Description** .

#### DTC C0895

DTC Symptom	DTC Symptom Descriptor
00	No additional information

##### Conditions for Running the DTC

The ignition is ON.

##### Conditions for Setting the DTC

The DTC is set when the battery voltage is outside the normal range of 9-15.5 volts.

##### Action Taken When the DTC Sets

Disable all functionality

##### Conditions for Clearing the MIL/DTC

- The scan tool can be used to clear the DTC.

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- The DTC is saved as history when the ALC sensor no longer sees battery voltage outside the normal range of 9-15.5 volts. The DTC will clear if the fault does not return after 50 consecutive ignition cycles.

**Diagnostic Aids**

DTC C0895 may set when the vehicle is placed on a battery charger, on fast charge, for a long period of time. It may also be set by an intermittent charging system malfunction.

**Test Description**

The numbers below refer to the step numbers on the diagnostic table.

**1:** This test determines whether the malfunction is in the supply voltage or the ALC sensor.

**2:** This step checks for high resistance, a short to ground or an open in the battery positive voltage circuit.

**DTC C0895**

Step	Action	Value(s)	Yes	No
<b>Schematic Reference: <u>Suspension Controls Schematics</u></b>				
<b>Connector End View Reference: <u>Suspension Controls Connector End Views</u></b>				
<b>1</b>	Measure the voltage in the automatic level control (ALC) sensor battery positive voltage circuit. Does the voltage measure within the specified values? Test for high resistance, a short to ground or an open in the battery positive voltage circuit of the ALC sensor. Refer to <b><u>Circuit Testing</u></b> and <b><u>Wiring Repairs</u></b> .	9-15.5 V	Go to <b>Step 3</b>	Go to <b>Step 2</b>
<b>2</b>	Did you find and correct the condition?  1. Use the scan tool in order to clear the DTCs.	-	Go to <b>Step 7</b>	Go to <b><u>Battery Inspection/Test</u></b>
<b>3</b>	2. Operate the vehicle within the Conditions for Running the DTC as specified in the	-		



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Step	supporting Action.	Value(s)	Yes	No
<b>Schematic Connector</b>	<b>Reference: Suspension Controls Schematics</b> Does the DTC reset?		Go to <b>Step 4</b>	Go to <b>Step 6</b>
<b>1</b> <b>4</b>	Inspect for poor connections at the harness connector of the ALC sensor. Refer to <b>Testing for Intermittent Conditions and Poor Connections and Connector Repairs</b> . Measure the voltage in the sensor battery positive voltage circuit. Does the voltage measure within the specified values?	9-15.5 V -	Go to <b>Step 3</b>	Go to <b>Step 2</b>
<b>2</b> <b>5</b>	Did you find and correct the condition? Test for high resistance, a short to ground or an open in the battery positive voltage circuit of the ALC sensor. Refer to <b>Automatic Level Control Sensor Replacement and Wiring Repairs</b> . replacement, setup and programming. Did you find and correct the condition? Did you complete the replacement?	- -	Go to <b>Step 7</b>	Go to <b>Step 5</b>
<b>6</b>	Inspect for poor connections at the harness connector of the ALC sensor. Refer to <b>Testing for Intermittent Conditions and Poor Connections and Connector Repairs</b> . Did you find and correct the condition?	-	Go to <b>Step 7</b>	Go to Diagnostic Aids
<b>7</b>	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text.  Does the DTC reset?	-	Go to <b>Step 2</b>	System OK

## SYMPTOMS - AUTOMATIC LEVEL CONTROL

Review the system operation in order to familiarize yourself with the system functions. Refer to **Automatic Level Control Description and Operation (F55)** or **Automatic Level Control Description and Operation (w/o F55)**.

**Visual/Physical Inspection**

- Inspect for aftermarket devices which could affect the operation of the automatic level control suspension. Refer to **Checking Aftermarket Accessories** .
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect for binding or damaged shock absorbers.

**Intermittent**

Electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

**Symptom List**

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Air Compressor Leak Test**
- **Automatic Level Control System Leak Test**
- **Rear of Vehicle High**
- **Rear of Vehicle Low**

**AIR COMPRESSOR LEAK TEST****Tools Required**

- **J 22124-B** Pressure Gage (0-300 psi). See **Special Tools**.
- **J 22124-91** Pressure Gage Adapter

**Test Procedure**

1. Attach the **J 22124-91** pressure gage adapter to the air dryer.
2. Attach the **J 22124-B** pressure gage to the **J 22124-91** pressure gage adapter with the toggle valve on the opposite side of the air compressor. Close the toggle valve.
3. Apply air pressure at the Schrader valve. Pressurize until the **J 22124-B** pressure gage reads 690 kPa (100 psi). See **Special Tools**.
4. Check the following areas using soap bubbles:
  - Solenoid valve-Replace the air compressor head if leaking.
  - Air dryer to compressor head O-ring-Replace the air dryer if leaking.
  - Air dryer cover-Replace the air dryer if leaking.
  - Air compressor head gasket-Replace the air compressor head if leaking.

- Air compressor head cover gasket-Tighten the cover bolts to 5.6 N.m (50 lb in) if the head cover gasket is leaking. If the leak persists, replace the air compressor head.

## AUTOMATIC LEVEL CONTROL SYSTEM LEAK TEST

### Automatic Level Control System Leak Test

Step	Action	Yes	No
1	Did you review the Automatic Level Control System Description and Operation and perform the necessary inspections?  1. Disconnect the air tube from the air dryer. 2. Connect the air tube to the <b>J 22124-B</b> Pressure Gage on the side opposite the toggle valve. See <b>Special Tools</b> . 3. Close the toggle valve.	Go to <b>Step 2</b>	Go to <b>Symptoms - Automatic Level Control</b>
2	4. Apply service air pressure to <b>J 22124-B</b> service valve until the gage reads 550 kPa (80 psi). See <b>Special Tools</b> . 5. Monitor the <b>J 22124-B</b> gage pressure for 1 minute. See <b>Special Tools</b> .		
3	Does the system maintain pressure? Inspect the shock absorber air sleeves for air leakage using soapy water. Did you find an air leak?	System OK  Go to <b>Step 5</b>	Go to <b>Step 3</b>  Go to <b>Step 4</b>
4	Inspect the air tubes and connections for air leakage using soapy water. Did you find and correct the condition?	Go to <b>Step 6</b>	-
5	Replace the shock absorbers. Refer to <b>Shock Absorber Replacement</b> . Did you complete the replacement?	Go to <b>Step 6</b>	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to <b>Step 2</b>

# REAR OF VEHICLE HIGH

## Rear of Vehicle High

Step	Action	Yes	No
<b>Schematic Reference: <u>Automatic Level Control Schematics</u></b>			
<b>Connector End View Reference: <u>Automatic Level Control Connector End Views</u></b>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to <b>Step 2</b>	Go to <b><u>Diagnostic System Check - Vehicle</u></b>
2	<ol style="list-style-type: none"> <li>1. Turn ON the ignition, with the engine OFF.</li> <li>2. Listen for the automatic level control (ALC) air compressor to activate.</li> </ol>		
	Is the ALC air compressor running for more than 5 minutes?	Go to <b>Step 3</b>	Go to <b>Step 6</b>
3	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Remove the ALC compressor relay.</li> <li>3. Turn ON the ignition, with the engine OFF.</li> </ol>		
	Is the air compressor running?	Go to <b>Step 4</b>	Go to <b>Step 5</b>
4	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Reinstall the ALC compressor relay.</li> <li>3. Repair the short to voltage in the ALC air compressor control circuit.</li> </ol>		
	Is the repair complete?	Go to <b>Step 13</b>	Go to <b>Step 1</b>
5	<ol style="list-style-type: none"> <li>1. Turn OFF the ignition.</li> <li>2. Replace the ALC air compressor relay.</li> </ol>		
	Is the repair complete?	Go to <b>Step 13</b>	Go to <b>Step 1</b>
	Inspect the left and right rear position sensors for damage and disconnected		

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Step	links.	Action	Yes	No
6	Schematic Reference: Automatic Level Control Schematics	Are any damaged sensors or disconnected links present?	Go to Step 7	Go to Step 8
7	Connector End View Reference: Automatic Level Control Connector End Views	Do you perform the Diagnostic System Check on the vehicle? <b>Automatic Level Control Sensor Replacement.</b>	Go to Step 2	Go to Diagnostic System Check Vehicle
2		Is the repair complete? 1. Turn ON the ignition, with the engine OFF. 1. Remove the ALC intake filter from the vehicle body. Do not remove it from the ALC air compressor (ALC) air compressor to activate. 2. Using the scan tool, cycle ALC air compressor.	Go to Step 13	Go to Step 1
8		Is the ALC air compressor running for more than 5 minutes? After 5 minutes, stop cycling.	Go to Step 3	Go to Step 6
3		4. Turn OFF the ignition. 2. Check the ALC intake hose while checking to see if air is exiting the ALC intake air filter. 2. Remove the ALC compressor relay. 3. Turn ON the ignition, with the engine OFF. Is air exiting the ALC intake air filter? Is the ALC compressor running?	Go to Step 11 Go to Step 4	Go to Step 9 Go to Step 5
4		4. Disconnect the air tubes from both rear shock absorbers. 2. Reinstall the ALC compressor relay. 3. Connect the J 22124-B ALC Pressure Gage to both (between) ALC air compressor control circuit air tubes. See <b>Special Tools</b> .		
9		4. Open the gage toggle valve. Is the gage reading correct?	Go to Step 13	Go to Step 1
10		5. Disconnect the air tube from the ALC air dryer. 6. Apply shop air to the gage Schrader valve. Is air exiting both of the air tubes at the ALC air dryer connection? 1. Turn OFF the ignition. 2. Replace the ALC air compressor assembly. Refer to <b>Air Compressor Replacement</b> . 3. Install the ALC intake air filter on	Go to Step 10	Go to Step 12

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5	<p>2. Replace the vehicle body relay.</p> <p>Are all of the replacements and/or installations complete?</p> <p>Is the repair complete?</p>	Go to <b>Step 13</b>	Go to <b>Step 1</b>
6	<p>1. Turn the OFF and ignition on position sensors for damage and disconnected links.</p> <p>2. Connect the scan tool.</p> <p>3. Turn ON the ignition, with the engine OFF.</p> <p>Are any damaged sensors or disconnected links present?</p>	Go to <b>Step 7</b>	Go to <b>Step 8</b>
11 7	<p>4. Perform the ALC relearn procedure. Refer to <b>Body Control Module (BCM) Automatic Level Control Sensor Replacement Configuration</b>.</p> <p>Replace the damaged rear position sensor or reconnect the link. Refer to <b>Body Control Module (BCM) Automatic Level Control Sensor Replacement Configuration</b>.</p> <p>Is the repair complete?</p>	Go to <b>Step 13</b>	- Go to <b>Step 1</b>
12 8	<p>Has the ALC relearn procedure been completed?</p> <p>1. Remove the ALC intake filter from the vehicle body. Do not remove it from the ALC air compressor or hose.</p> <p>Replace the air tube going from the air dryer to both rear shock absorbers.</p> <p>Refer to <b>Air Tube Replacement</b>.</p> <p>Is the repair complete?</p>	Go to <b>Step 13</b>	-
13	<p>1. After 1 minute, stop cycling.</p> <p>2. Turn OFF the ignition.</p> <p>3. Cycle the ALC exhaust while checking to see if air is exiting the engine OFF.</p> <p>4. Wait for at least 5 minutes.</p> <p>Is air exiting the ALC intake air filter?</p> <p>Is the rear of the vehicle trim level?</p>	Go to <b>Step 11</b>	-
14	<p>1. Stop exhausting.</p> <p>2. Operate the system in order to verify the repair.</p> <p>Disconnect the air tubes from both rear shock absorbers.</p> <p>Did you check this condition?</p>	Go to <b>Step 14</b>	Go to <b>Step 9</b>
		System OK	Go to <b>Step 1</b>

### REAR OF VEHICLE LOW

#### Rear of Vehicle Low

Step	Action	Yes	No
<b>Schematic Reference: Automatic Level Control Schematics</b>			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to <b>Step 2</b>	Go to <b>Diagnostic System Check - Vehicle</b>
	1. Turn ON the ignition, with the		

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2	engine OFF. 2. Listen for the automatic level control (ALC) air compressor to activate.		
	Does the air compressor come on within 30 seconds?  1. Turn OFF the ignition. 2. Disconnect the ALC connector from the ALC air compressor assembly. 3. Disconnect the electronic suspension control (ESC) module connector. 4. Turn ON the ignition, with the engine OFF. 5. Jumper the ALC relay control circuit to ground. 6. Measure the voltage between the ALC compressor motor control circuit of the ALC air compressor connector and ground.	Go to <b>Step 9</b>	Go to <b>Step 3</b>
3			
	Does the voltmeter display a voltage greater than 10 volts?  1. Remove the jumper wire from the ALC relay control circuit. 2. Turn OFF the ignition. 3. Check for continuity between ALC compressor ground circuit of the ALC air compressor connector and ground.	Go to <b>Step 4</b>	Go to <b>Step 7</b>
4			
	Is there continuity?  1. Turn OFF the ignition. 2. Repair the open circuit in the ALC air compressor ground circuit.	Go to <b>Step 6</b>	Go to <b>Step 5</b>
5			
	Is the repair complete?	Go to <b>Step 14</b>	-
	Replace the ALC air compressor		

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Step	assembly. Refer to <u>Automatic Compressor</u>	Yes	No
<b>Schematic</b>	<b>Replacement Automatic Level Control Schematics</b>		-
1	Is the repair complete? Did you perform the Diagnostic System Check Vehicle? 1. Remove the jumper wire from ALC relay control circuit. 2. Turn OFF the ignition.	Go to <b>Step 12</b>  Go to <b>Step 2</b>	Go to <b>Diagnostic System Check Vehicle</b>
2	3. Turn ON the ignition, with the engine OFF. • Open ELC fuse 2. Listen for the automatic level control (ALC) air compressor to activate. • Open ALC air compressor control circuit Does the air compressor come on within 30 seconds? • Open ELC relay control	      Go to <b>Step 9</b>	-      Go to <b>Step 3</b>
3	1. Turn OFF the ignition. 2. Disconnect the ALC connector from the ALC air compressor assembly. <b>IMPORTANT:</b> 3. Disconnect the electronic suspension control (ESC) module connector. 4. Turn ON the ignition, with the engine OFF. • A faulty air compressor 5. A jumper the ALC relay control circuit to ground. 6. Measure the voltage between the ALC compressor motor control circuit of the ALC air compressor Repair the shorted circuit condition or replace the fuse. Is the repair complete? Inspect the left and right rear position sensors for damage and disconnected links. Does the voltmeter display a voltage greater than 0 volts? Are any damaged sensors or disconnected links present?	Go to <b>Step 8</b>        Go to <b>Step 14</b>	-          Go to <b>Step 7</b>
9	1. Remove the jumper wire from the ALC relay control circuit. Perform the ALC System Leak Test. Is a leak present? 2. Turn OFF the ignition.	Go to <b>Step 13</b>  Go to <b>Step 11</b>	Go to <b>Step 10</b>  Go to <b>Step 12</b>
11	Repair the leak in the ALC System. 3. Check for continuity between ALC Is the repair complete?	Go to <b>Step 14</b>	-
12	1. Turn OFF the ignition. 2. Connect the scan tool. 3. Turn ON the ignition, with engine OFF.		-



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4	4. Perform the ALC trim height adjustment. Adjust the air compressor connector and ground. Has the ALC trim height adjustment been completed? Is there continuity?	Go to Step 6	Go to Step 5
13	Replace the damaged position sensor or reconnect the link. Refer to <b>Automatic Level Control Sensor Replacement</b> . Repair the open circuit in the air compressor ground circuit. Is the replacement complete?	Go to Step 14	- -
14 6	Operate the system in order to verify the repair. Refer to <b>Air Compressor Replacement</b> . Is the condition correct?	System OK	Go to Step 1

## REPAIR INSTRUCTIONS

### SUSPENSION POSITION CALIBRATION

#### ESCM Programming (ESC)

If the electronic suspension control module (ESCM) has been replaced, it needs to be programmed. Refer to **Electronic Suspension Control Module Programming and Setup** .

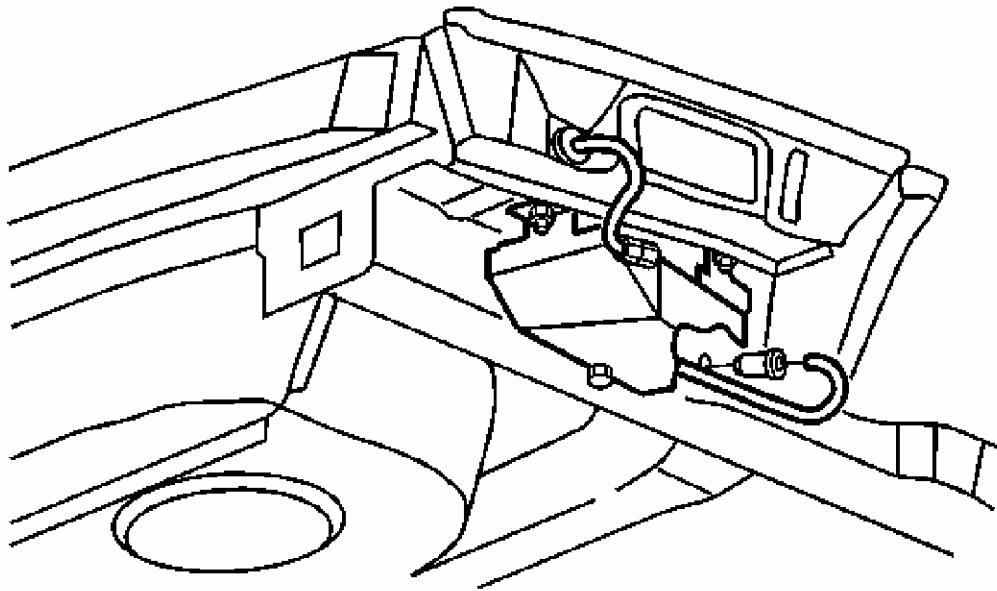
#### ALCM Programming (w/o ESC)

If the automatic level control module (ALCM) has been replaced, it needs to be programmed. Refer to **Service Programming System (SPS)** .

### AUTOMATIC LEVEL CONTROL AIR COMPRESSOR AIR FILTER REPLACEMENT

#### Removal Procedure

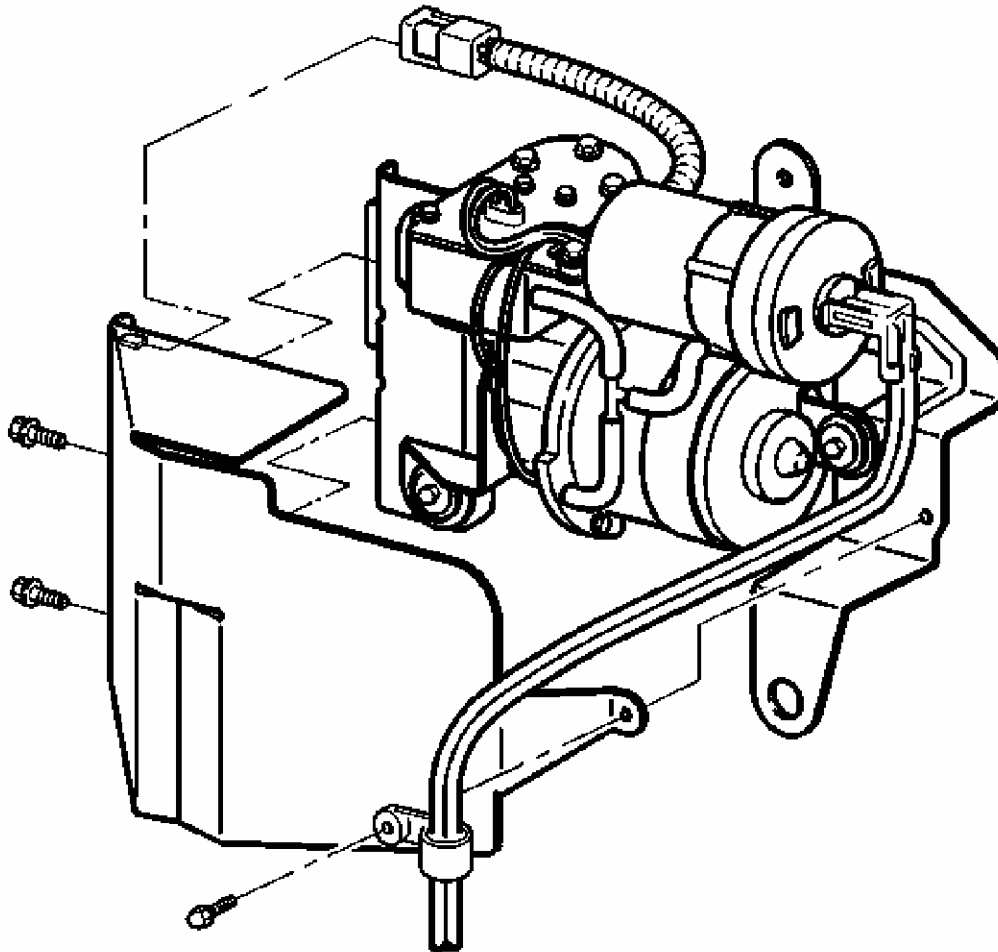
1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .



**Fig. 7: Disconnecting/Reconnecting Air Filter**  
**Courtesy of GENERAL MOTORS CORP.**

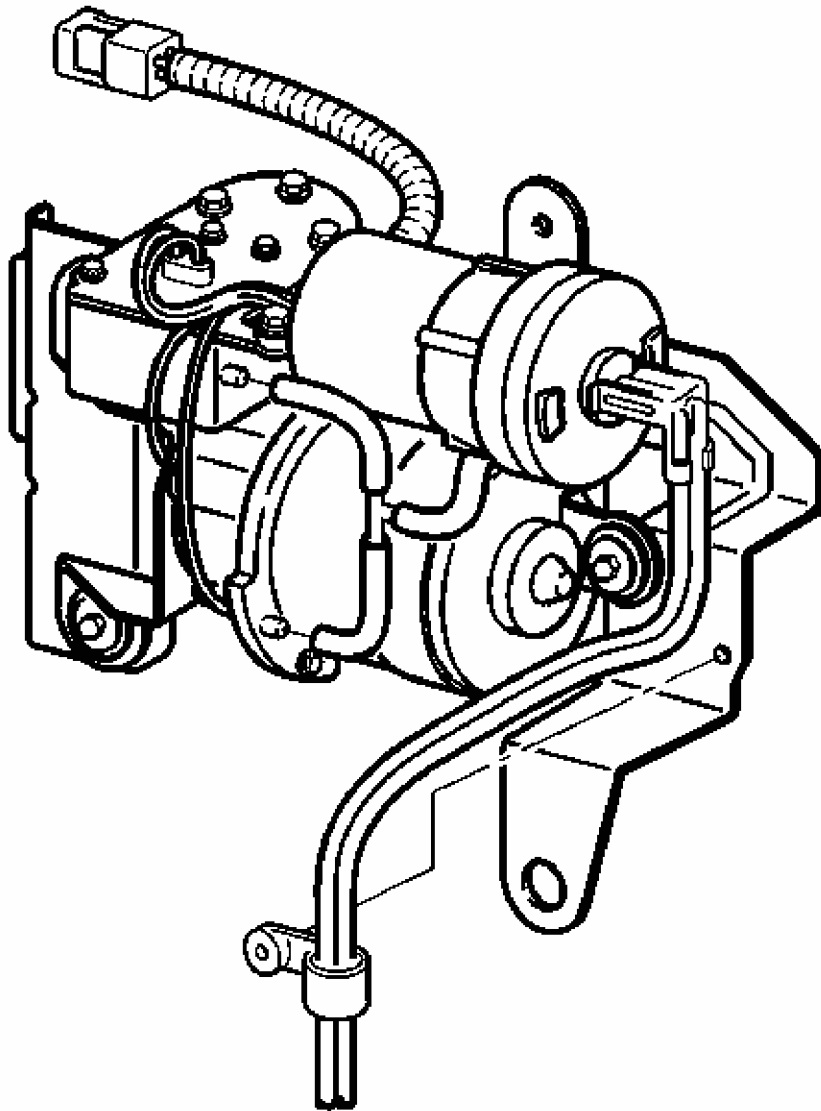
**IMPORTANT:** Before disconnecting the air hose from the intake air filter or the air compressor, clean the components and the surrounding area to prevent dirt and other foreign material from entering the air compressor.

2. Disconnect the intake air filter from the body rail and the air hose.



**Fig. 8: Removing/Installing Air Compressor Connector At Connector Anchor**  
**Courtesy of GENERAL MOTORS CORP.**

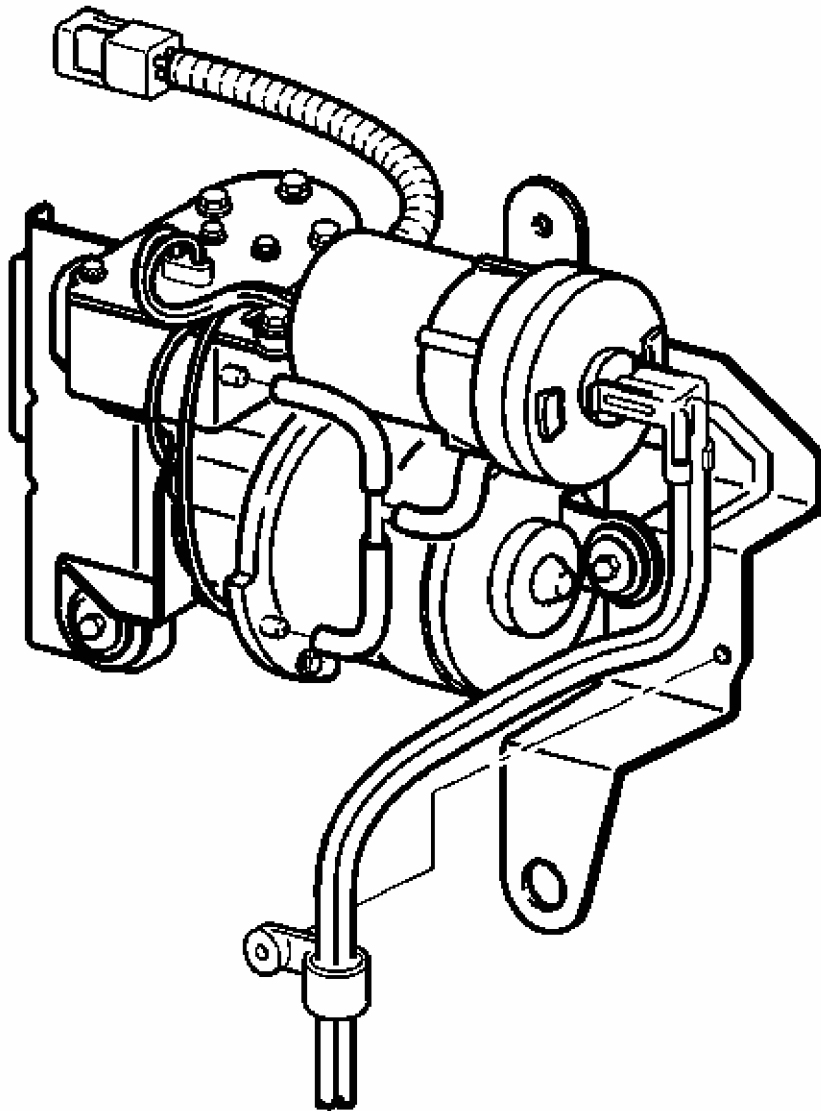
3. Slide the air compressor connector off of the connector anchor.
4. Remove 3 bolts and the heat shield from the air compressor bracket.



**Fig. 9: Disconnecting/Reconnecting Air Hose From Air Compressor Assembly At Two Places**

**Courtesy of GENERAL MOTORS CORP.**

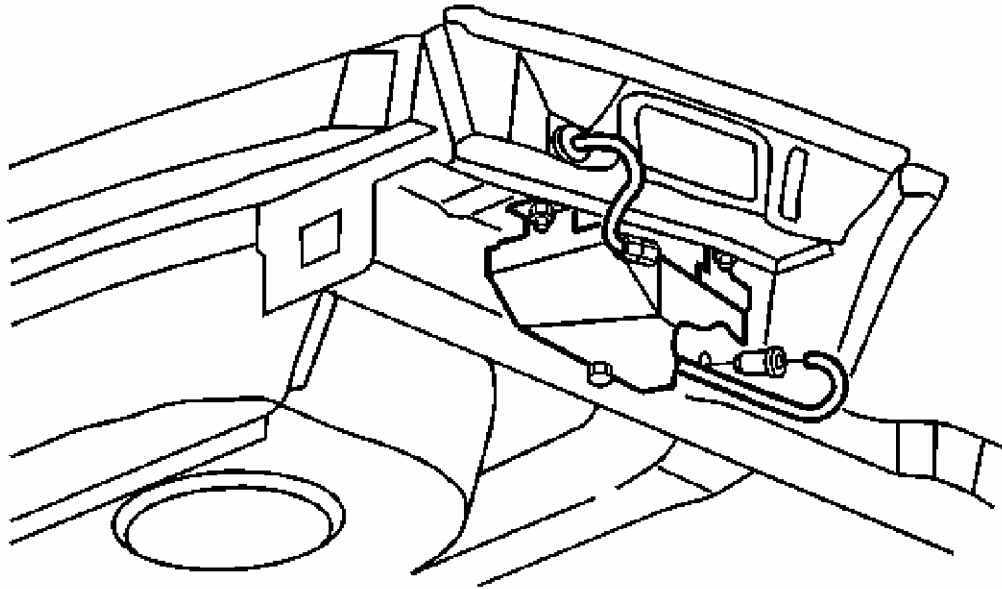
5. Disconnect the air hose from the air compressor assembly at 2 places.



**Fig. 10: Disconnecting/Reconnecting Air Hose From Air Compressor Assembly At Two Places**

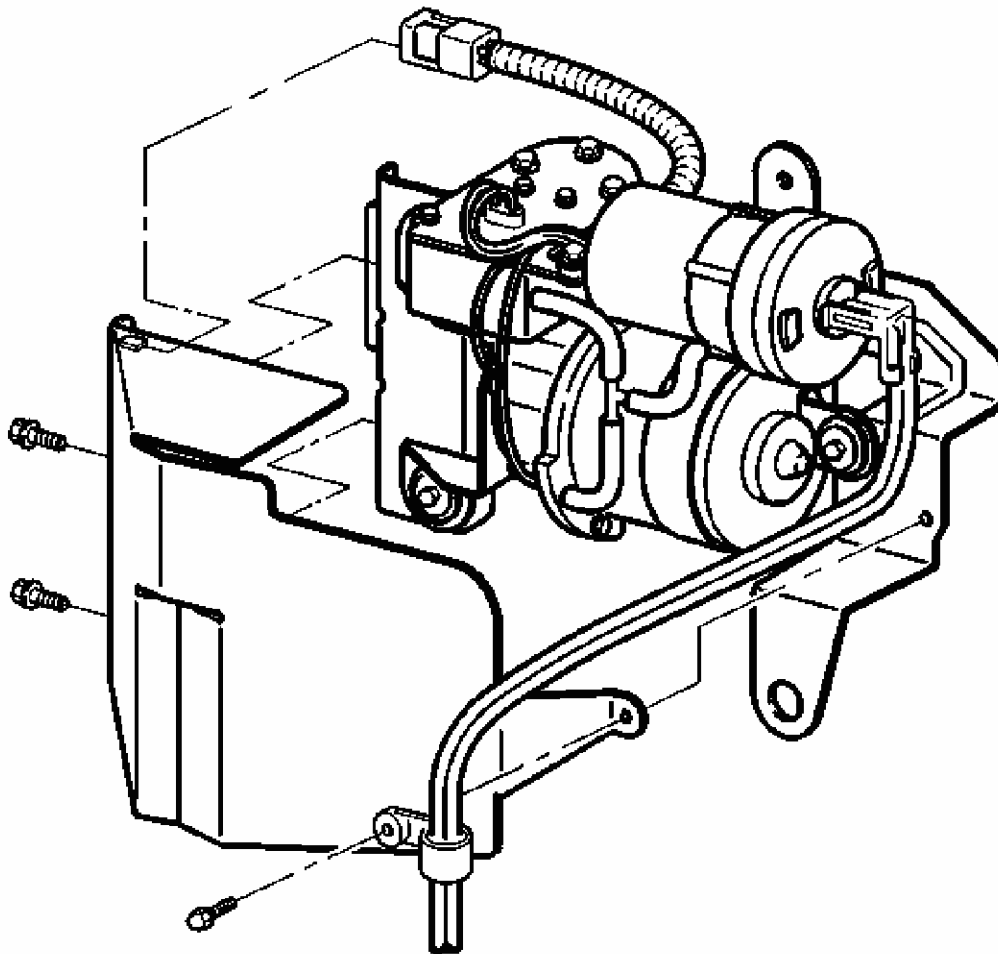
**Courtesy of GENERAL MOTORS CORP.**

1. Connect the air hose to the air compressor assembly at 2 places.



**Fig. 11: Disconnecting/Reconnecting Air Filter**  
**Courtesy of GENERAL MOTORS CORP.**

2. Connect the intake air filter to the air hose and the body rail.



**Fig. 12: Removing/Installing Air Compressor Connector At Connector Anchor**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice .

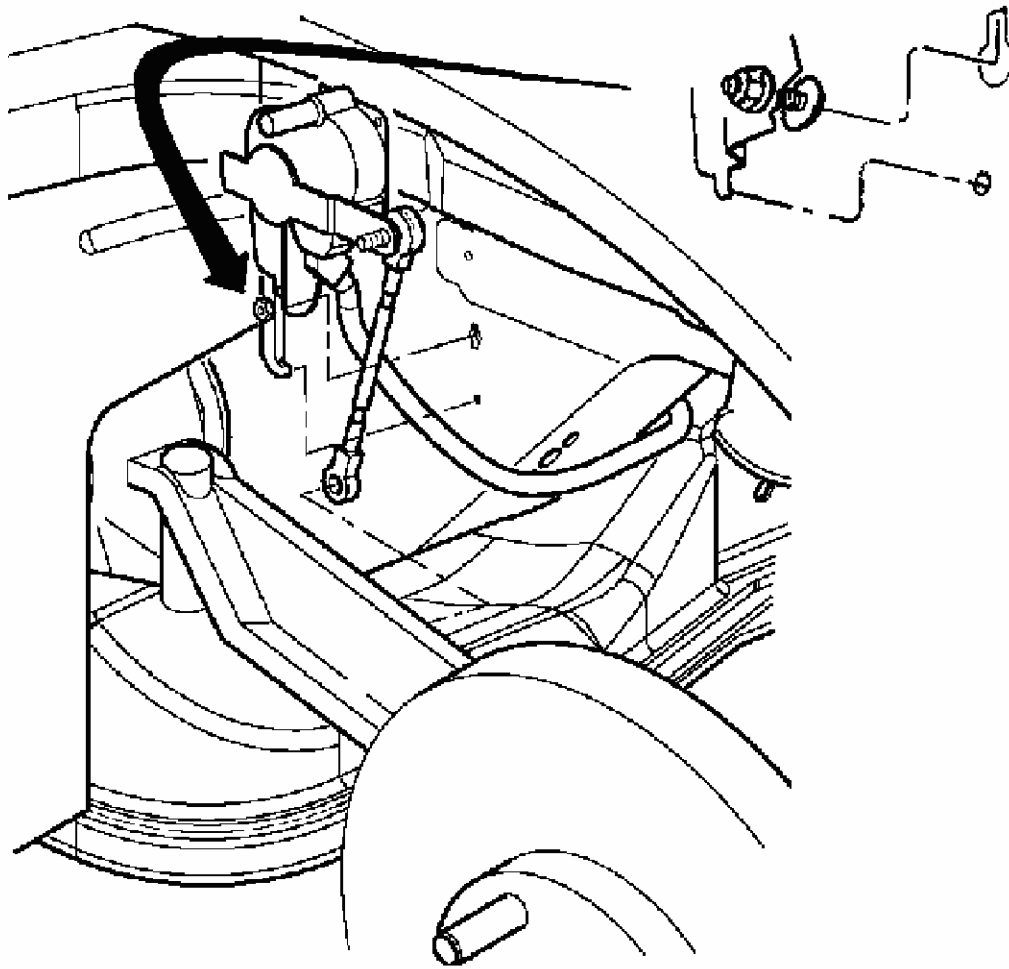
3. Install the heat shield and the harness tie with 3 bolts.

**Tighten:** Tighten 3 bolts to 4 N.m (35 lb in).

4. Install the air compressor connector onto the connector anchor.
5. Lower the vehicle. Refer to Lifting and Jacking the Vehicle .

## AUTOMATIC LEVEL CONTROL SENSOR REPLACEMENT

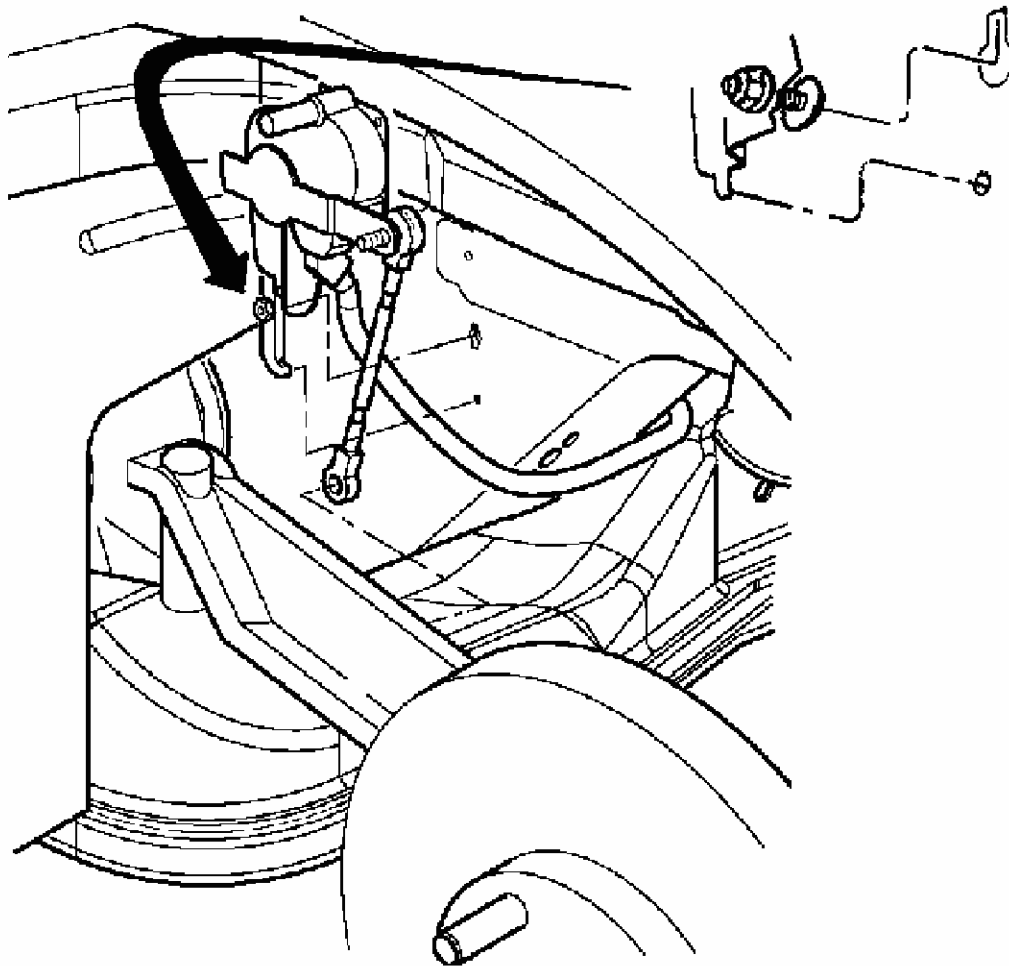
### Removal Procedure



**Fig. 13: View of Height Sensor Connector and Sensor Link From Ball Stud**  
**Courtesy of GENERAL MOTORS CORP.**

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the wheel from the vehicle. Refer to **Tire and Wheel Removal and Installation** .
3. Disconnect the height sensor connector.
4. Disconnect the sensor link from the ball stud.
5. Loosen the sensor mounting nut.
6. Disengage the anti-rotation tab and slide the sensor downward.
7. Remove the sensor from the vehicle.





**Fig. 14: View of Height Sensor Connector and Sensor Link From Ball Stud**  
**Courtesy of GENERAL MOTORS CORP.**

1. Insert head of the sensor mounting stud into the key hole.
2. Slide the sensor upward until the anti-rotation tab engages in the lower hole.

**NOTE:** Refer to Fastener Notice .

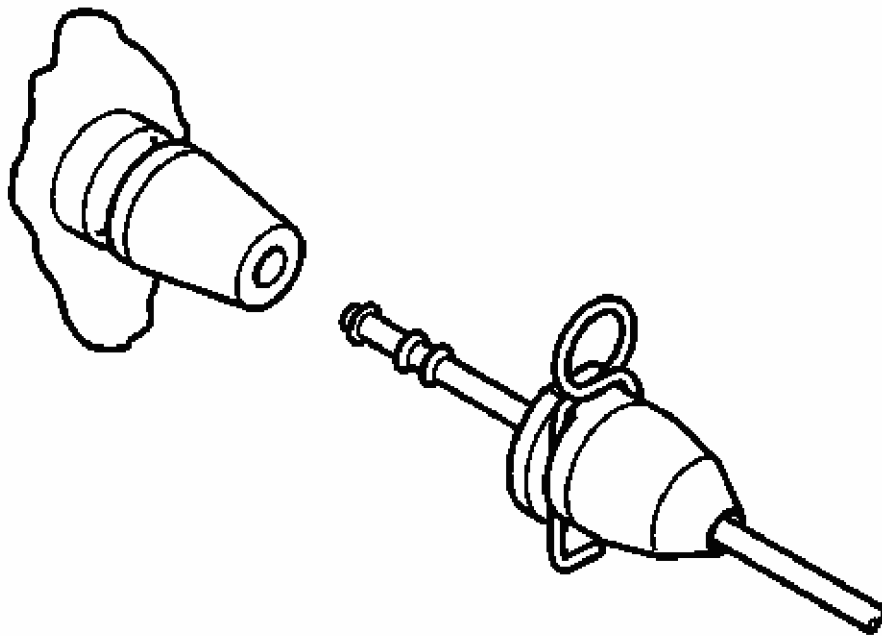
3. Tighten the sensor mounting nut.

**Tighten:** Tighten the nut to 9 N.m (80 lb in).

4. Connect the sensor link on the ball stud.
5. Connect the height sensor connector.

6. Install the wheel on the vehicle. Refer to **Tire and Wheel Removal and Installation** .
7. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** .
8. Refer to **Control Module References** for programming and setup information.

#### **AIR TUBE REPLACEMENT**



**Fig. 15: View Of Air Tube**

**Courtesy of GENERAL MOTORS CORP.**

At the rear shock absorbers, the air tube connectors are held on with spring clips which snap into the grooves of the shock absorber air fittings. Air tube connectors are sealed using 2 O-rings.

**IMPORTANT: Before disconnecting any air tube, clean the connector and the surrounding area to prevent dirt and other foreign material from entering the ELC system.**

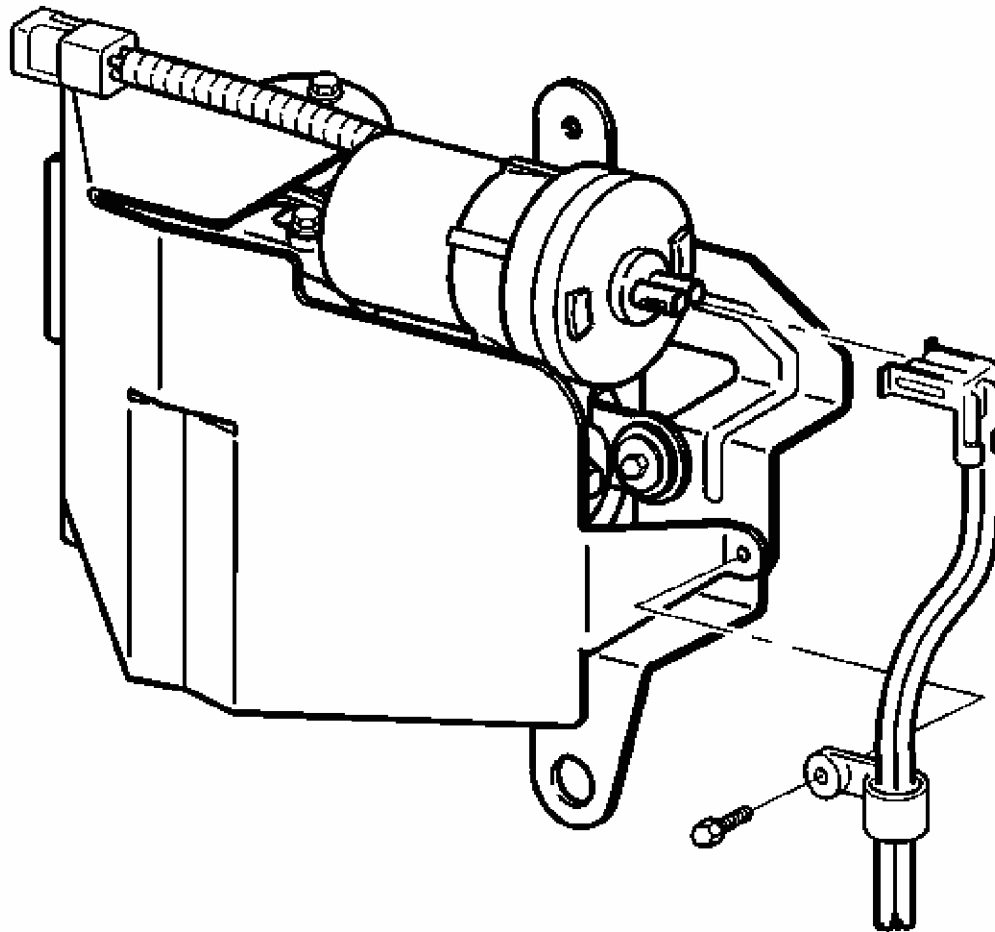
To disconnect an air tube from a shock absorber, rotate the spring clip 90 degrees out of the slots and pull the connector from the shock absorber.

**IMPORTANT:** Ensure that the air tube is routed correctly and all fasteners are used.

To connect an air tube to a shock absorber, lubricate the 2 O-rings using silicone lubricant, rotate the spring clip 90 degrees into the slots and push the air tube connector on the shock absorber fitting until spring clip snaps into fitting groove.

#### Removal Procedure

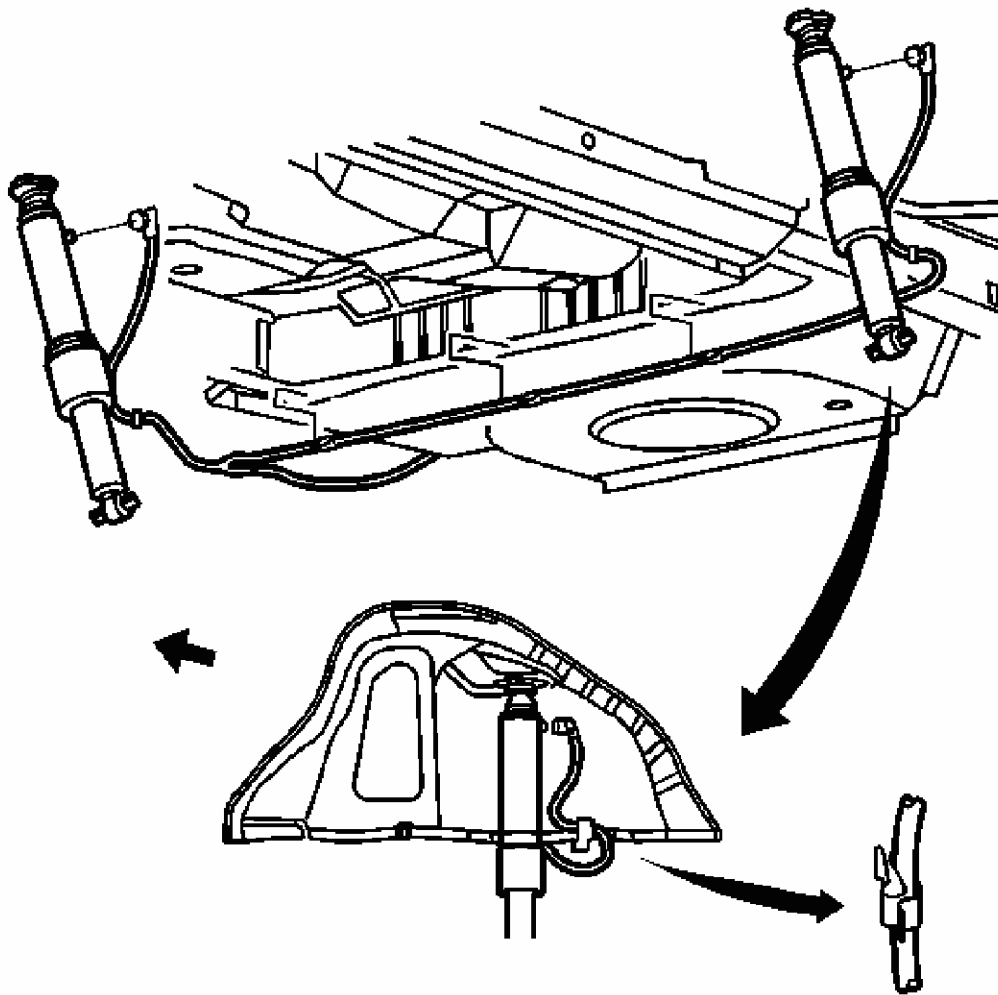
1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** .



**Fig. 16: Removing/Installing Air Tubes From Compressor**  
**Courtesy of GENERAL MOTORS CORP.**

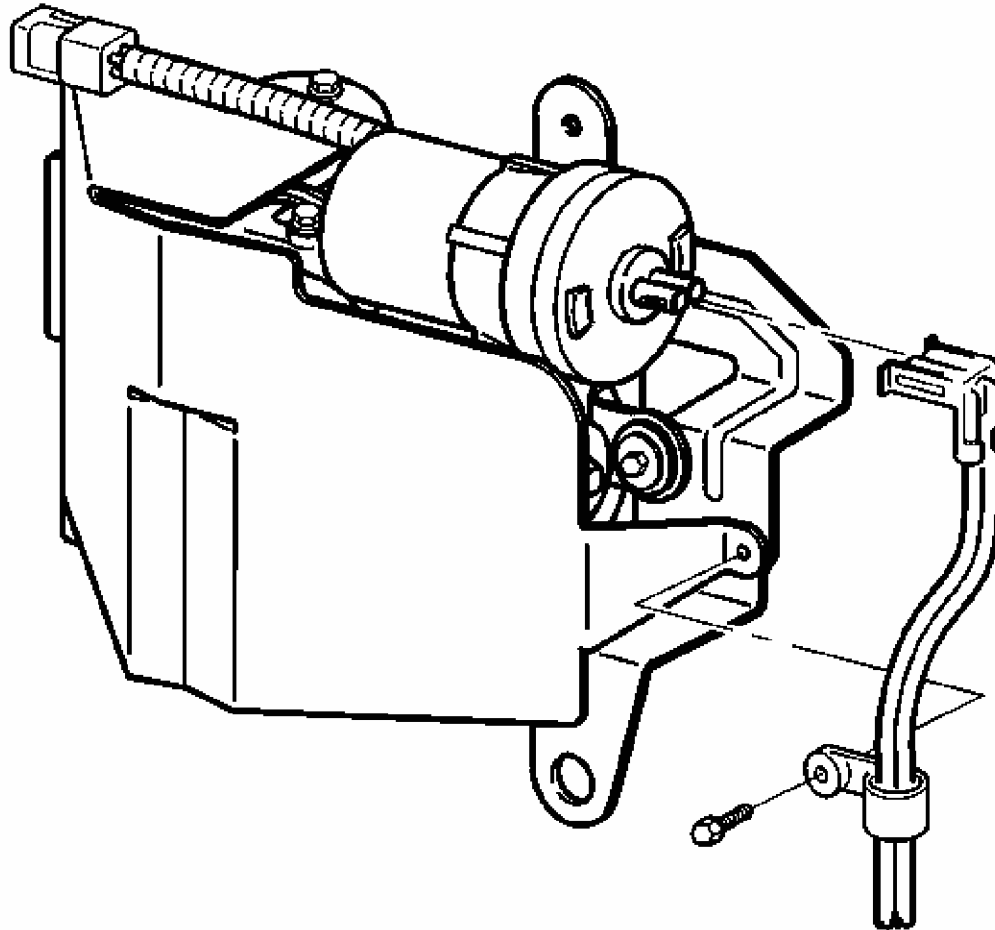
2. Remove the air tube from the air dryer.

3. Remove the bolt and the harness tie from the air compressor bracket.
4. Remove both rear wheels. Refer to **Tire and Wheel Removal and Installation** .



**Fig. 17: Identifying Air Tubes Connected To Shock Absorbers**  
**Courtesy of GENERAL MOTORS CORP.**

5. Disconnect the air tube from the left and right rear shock absorbers.
6. Remove the 2 metal clips from the air tube and the vehicle.
7. Remove the air tube with the 3 clips from the vehicle.

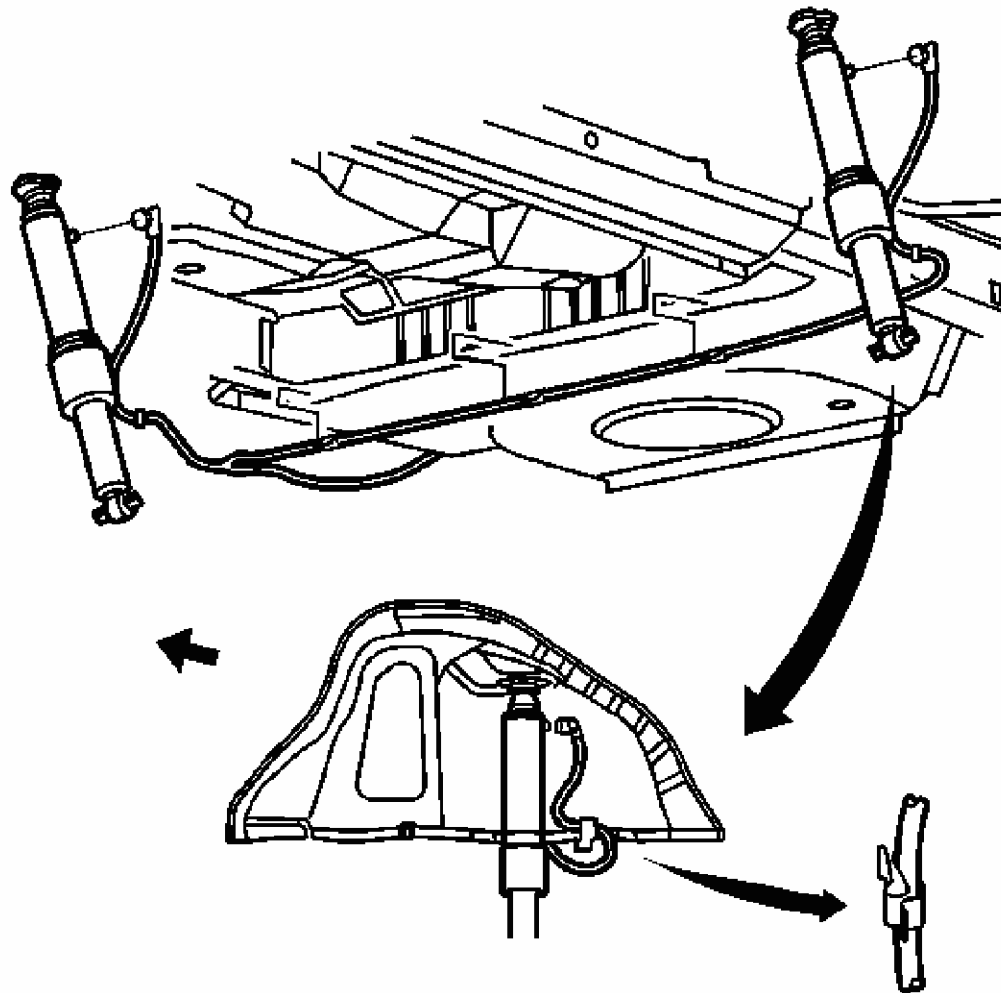


**Fig. 18: Removing/Installing Air Tubes From Compressor**  
**Courtesy of GENERAL MOTORS CORP.**

1. Connect the air tube to the air dryer.

**NOTE:** Refer to Fastener Notice .

2. Install the air tube with the harness tie and the bolt on the air compressor bracket.



**Fig. 19: Identifying Air Tubes Connected To Shock Absorbers**  
**Courtesy of GENERAL MOTORS CORP.**

3. Install the air tube on the vehicle with 3 clips.
4. Connect the air tube to the left and right rear shock absorbers.
5. Install 2 metal clips on the air tube and the vehicle. Place each clip immediately forward of the wheel house fold-over tabs on the LH and RH side of the vehicle.
6. Install both rear wheels. Refer to **Tire and Wheel Removal and Installation** .

**IMPORTANT:** Before driving the vehicle, turn the ignition on and wait approximately 45 seconds. This will ensure that the air adjustable shock absorbers are filled with residual

**pressure.**

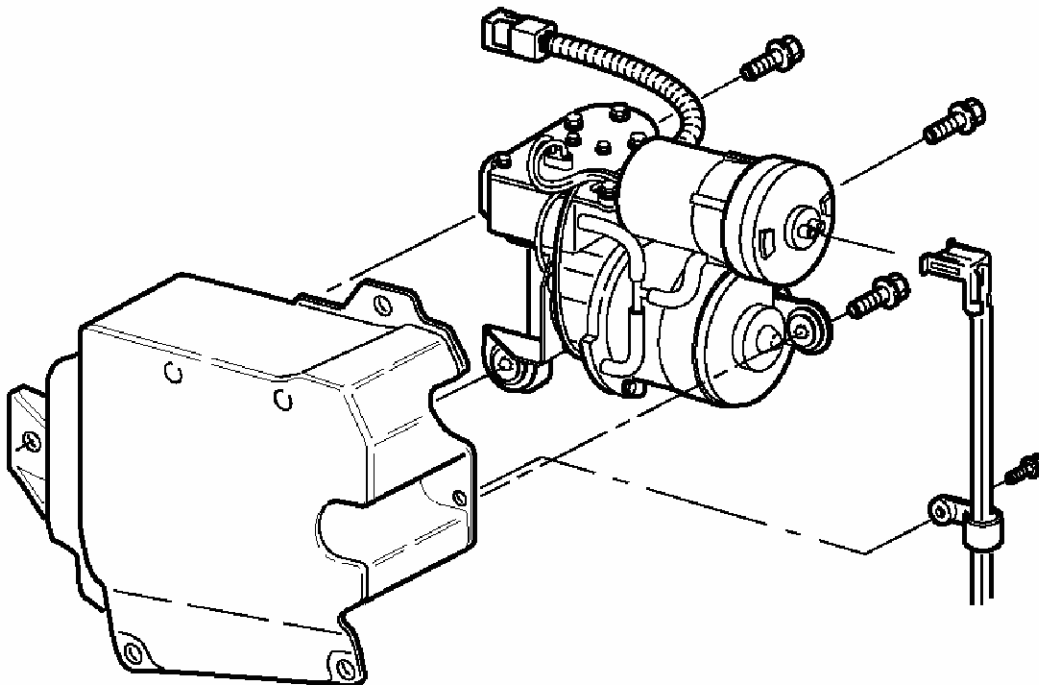
7. Lower the vehicle. Refer to Lifting and Jacking the Vehicle .

## **AIR COMPRESSOR REPLACEMENT**

### **Removal Procedure**

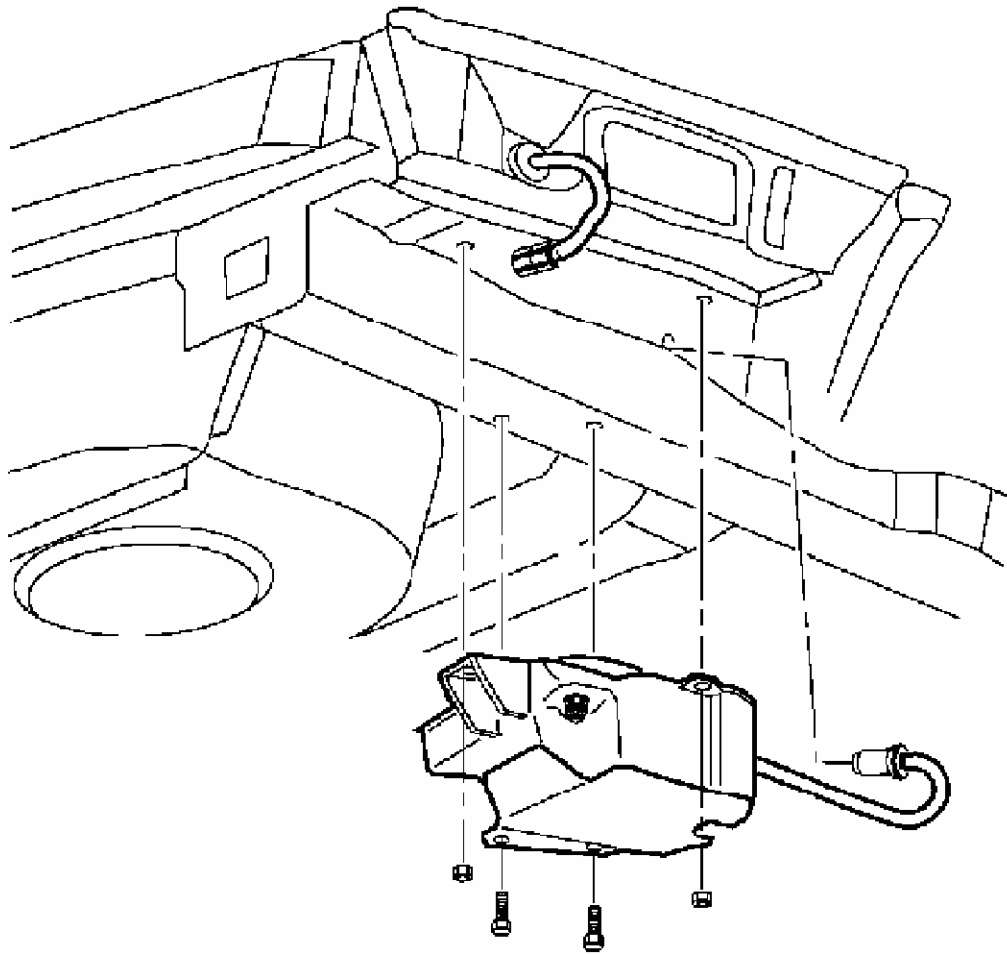
1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle .

**IMPORTANT:** Before disconnecting the air hose from the intake air filter or the air compressor, clean the components and the surrounding area to prevent dirt and other foreign material from entering the ALC system.



**Fig. 20: View Of Air Compressor & Bolts**  
**Courtesy of GENERAL MOTORS CORP.**

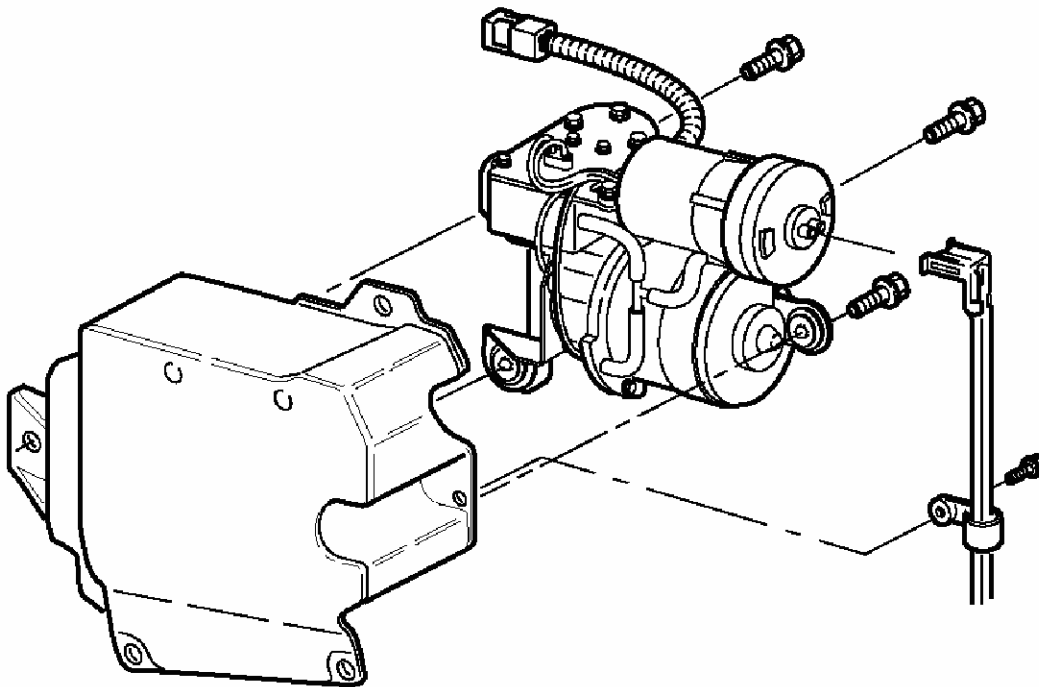
2. Disconnect the air tube from the air dryer.
3. Remove the bolt and the harness tie with the air tube from the air compressor bracket.



**Fig. 21: Identifying Air Compressor Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

4. Remove the intake air filter from the vehicle.
5. Remove the vehicle harness connector from the air compressor connector.
6. Remove the 2 nuts, 2 bolts and the air compressor assembly from the vehicle.

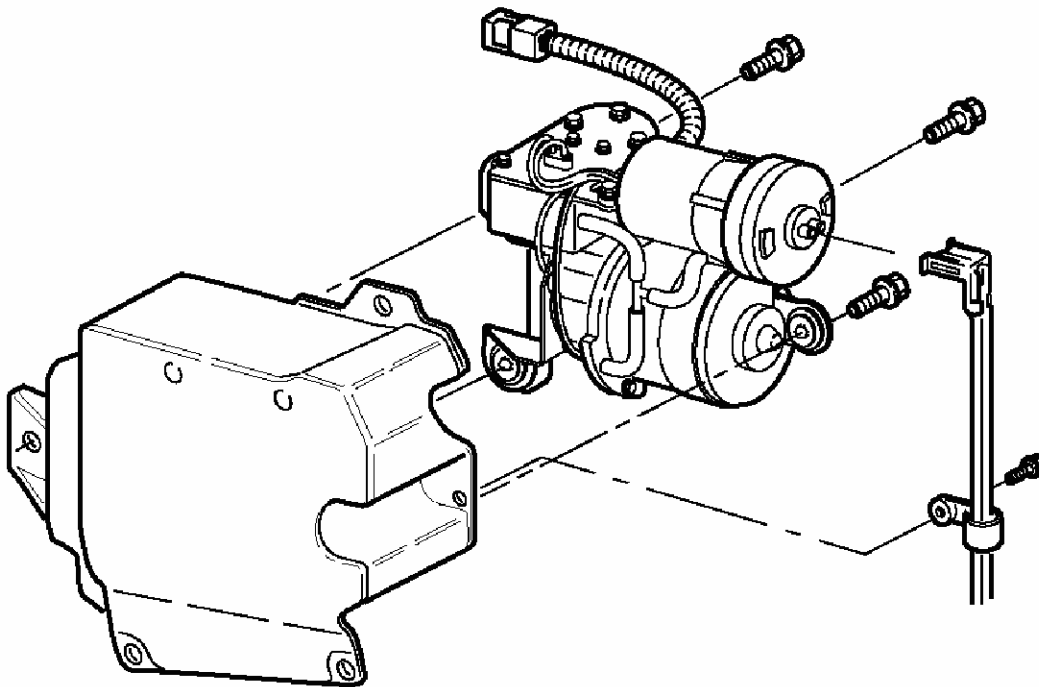




**Fig. 22: View Of Air Compressor & Bolts**  
**Courtesy of GENERAL MOTORS CORP.**

7. Slide the air compressor connector off of the connector anchor.
8. Remove 2 bolts and the heat shield from the air compressor bracket.

**Installation Procedure**



**Fig. 23: View Of Air Compressor & Bolts**  
Courtesy of GENERAL MOTORS CORP.

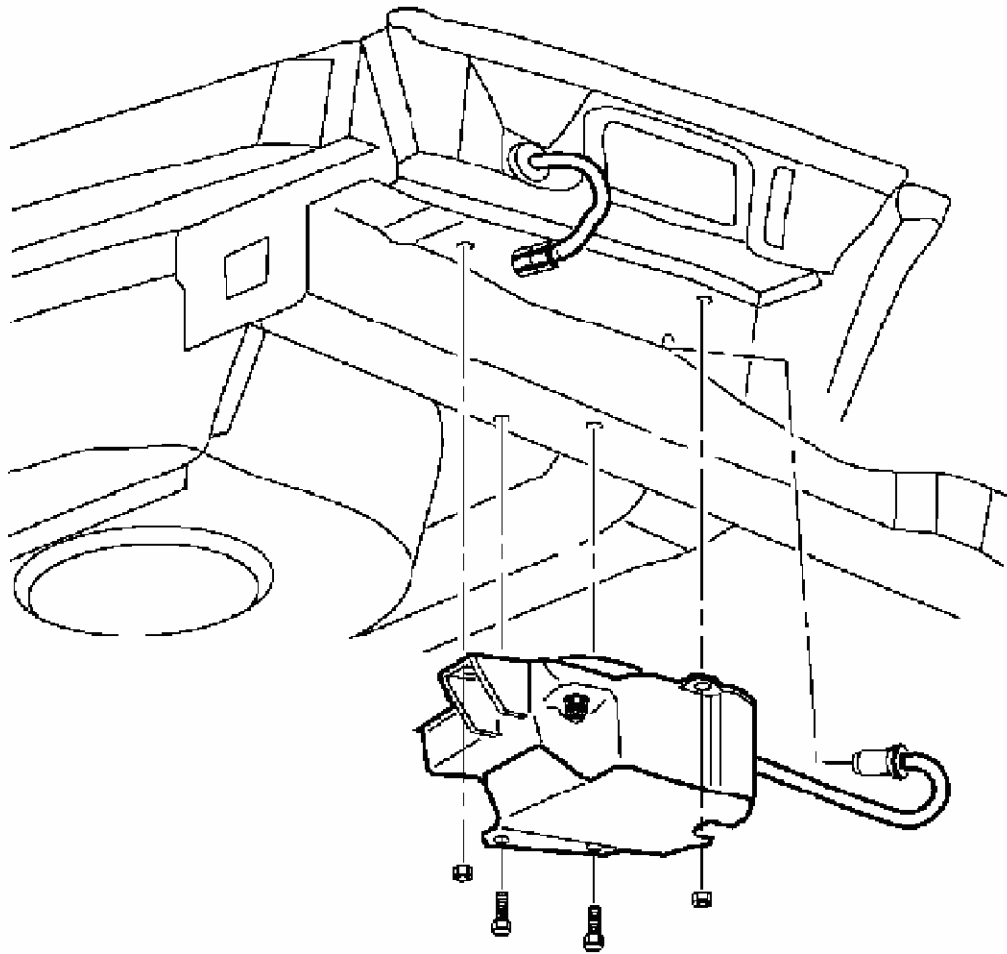
**NOTE:** Refer to Fastener Notice .

1. Install the heat shield on the air compressor bracket with three bolts.

Do not install the fourth heat shield bolt. It must be installed after the air tube is connected.

**Tighten:** Tighten the bolts to 4 N.m (35 lb in).

2. Install the air compressor connector to the connector anchor.

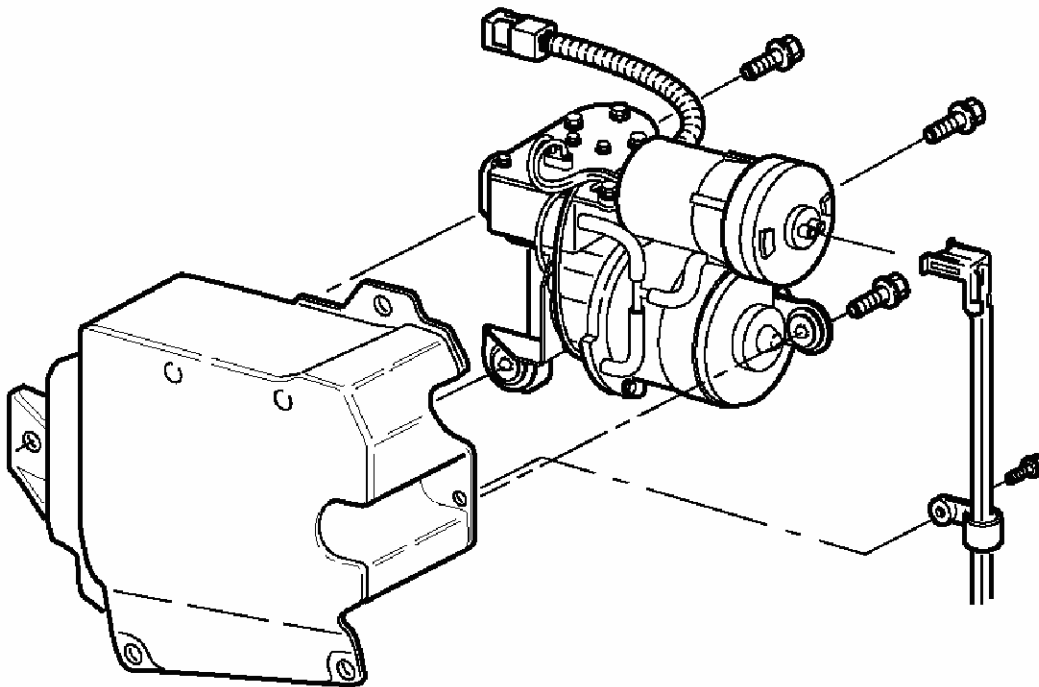


**Fig. 24: Identifying Air Compressor Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

3. Install the air compressor assembly on the vehicle with 2 nuts and 2 bolts.

**Tighten:**

- Tighten the bolts to 9 N.m (80 lb in).
  - Tighten the two nuts to 9 N.m (80 lb in).
4. Connect the harness connector to the air compressor connector.
  5. Install the intake air filter on the vehicle.



**Fig. 25: View Of Air Compressor & Bolts**  
Courtesy of GENERAL MOTORS CORP.

6. Connect the air tube to the air dryer.
7. Connect the air tube and the harness tie to the air compressor bracket with the bolt.

**Tighten:** Tighten the bolt to 4 N.m (35 lb in).

**IMPORTANT:** Before driving the vehicle, turn the ignition on and wait approximately 45 seconds. This will ensure that the air adjustable shock absorbers are filled with residual pressure.

8. Lower the vehicle.

## DESCRIPTION AND OPERATION

### AUTOMATIC LEVEL CONTROL DESCRIPTION AND OPERATION (F55)

The automatic level control (ALC) system maintains a desired rear suspension position under all types of towing, hauling and loading conditions.

The system uses the electronic suspension control module (ESCM), ALC relay, ALC

compressor assembly, air dryer, air lines, LR and RR shock absorbers with integral air chambers, LR and RR suspension position sensors, exhaust valve, driver information center (DIC) and the serial data circuit to perform the system functions.

When the vehicle is unloaded, the rear suspension is at a desired position, which is monitored by the ESCM using the LR and RR position sensor signal voltage inputs. As weight is added to the rear of the vehicle, the position sensor's signal voltage inputs change. When the ESCM detects a steady substantial change in both rear position sensor signal voltages for at least 10 seconds, it responds by commanding ON the ALC relay, which activates the compressor causing the air pressure in both rear shock absorber chambers to inflate. This inflation raises the rear of the vehicle to regain the desired suspension position. When weight is removed from the rear of the vehicle, the ESCM responds by commanding ON the exhaust valve causing the air pressure in both rear shock absorber chambers to deflate. This deflation lowers the rear of the vehicle to regain the desired suspension position.

The compressor is a positive displacement piston air pump driven by a 12-volt DC permanent magnet motor. The compressor draws filtered air through an intake line attached to an under body rail. The compressed air is then run through a dryer containing a moisture-absorbing chemical that dries the compressed air before it is sent to the shock absorber chambers. Each time the compressor is activated, the ESCM commands ON the exhaust valve for 1.5 seconds to release air from the compression chamber in the compressor's cylinder head ensuring low motor current draw upon compressor activation. The rear integration module (RIM) also limits the amount of compressor run time to 255 seconds to protect the compressor components from thermal damage.

The system also performs a self test on each ignition ON cycle in which the ESCM commands the ALC relay ON, activating the compressor for 4 seconds then monitors the position sensor's signal voltage inputs to verify the compressor is functioning and the system is holding air pressure.

The ESCM has the ability to detect malfunctions within the ALC system. Any malfunctions detected will cause the DIC to display the SERVICE SUSPENSION SYS message. For more information on other functions of the ESCM, refer to **Electronic Suspension Control Description and Operation** .

#### **AUTOMATIC LEVEL CONTROL DESCRIPTION AND OPERATION (W/O F55)**

The automatic level control (ALC) system maintains a desired rear suspension position under all types of towing, hauling and loading conditions.

The system uses the automatic level control module (ALCM) with integral suspension position sensor, ALC relay, ALC compressor assembly, air dryer, air lines, LR and RR shock absorbers with integral air chambers, exhaust valve, driver information center (DIC) and the serial data circuit to perform the system functions.

When the vehicle is unloaded, the rear suspension is at a desired position, which is monitored by the ALCM using its integral position sensor's signal voltage input. As weight is added to the rear of the vehicle, the position sensor's signal voltage input changes. When the ALCM detects a steady substantial change in position sensor signal voltage for at least 10 seconds, it responds by commanding ON the ALC relay, which activates the compressor causing the air pressure in both rear shock absorber chambers to inflate. This inflation raises the rear of the vehicle to regain the desired suspension position. When weight is removed from the rear of the vehicle, the ALCM responds by commanding ON the exhaust valve causing the air pressure in both rear shock absorber chambers to deflate. This deflation lowers the rear of the vehicle to regain the desired suspension position.

The compressor is a positive displacement piston air pump driven by a 12-volt DC permanent magnet motor. The compressor draws filtered air through an intake line attached to an under body rail. The compressed air is then run through a dryer containing a moisture-absorbing chemical that dries the compressed air before it is sent to the shock absorber chambers. Each time the compressor is activated, the ALCM commands ON the exhaust valve for 1.5 seconds to release air from the compression chamber in the compressor's cylinder head ensuring low motor current draw upon compressor activation. The ALCM also limits the amount of compressor run time to 255 seconds to protect the compressor components from thermal damage.

The system also performs a self test on each ignition ON cycle in which the ALCM commands the ALC relay ON, activating the compressor for 4 seconds then monitors the position sensor's signal voltage input to verify the compressor is functioning and the system is holding air pressure.

The ALCM has the ability to detect malfunctions within the ALC system. Any malfunctions detected will cause the DIC to display the SERVICE SUSPENSION SYS message.

## SPECIAL TOOLS AND EQUIPMENT

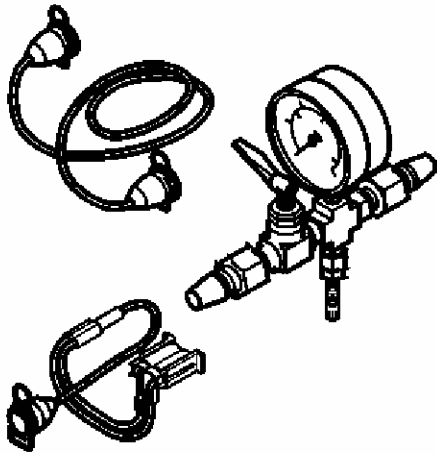
### SPECIAL TOOLS

#### Special Tools

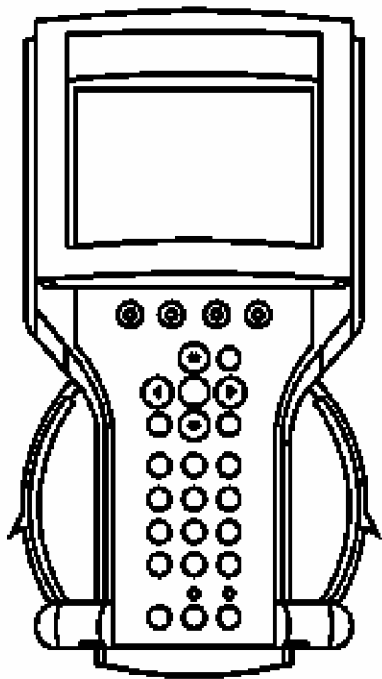
Illustration	Tool Number/Description
	<p>J 22124-B Pressure Gage (0-300 psi) NOTE: Includes Adapter J 22124-91 and</p>

## 2006 Buick Lucerne CXS

2006 SUSPENSION Automatic Level Control - Lucerne



Adapter Tube



Scan Tool

## 2006 Buick Lucerne CXS

2006 SUSPENSION Automatic Level Control - Lucerne



## 2006 Buick Lucerne CXS

2006 SUSPENSION Automatic Level Control - Lucerne